NEWHAVEN DISPLAY INTERNATIONAL

Product Specification

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, 6:00 Optimal View
V#N-	Built-in Negative Voltage

Newhaven Display International, Inc.
2661 Galvin Court, Elgin, IL 60124 USA

Ph: 847.844.8795 | Fx: 847.844.8796
www.newhavendisplay.com

REACH Compliant

RoHS Compliant

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Table of Contents

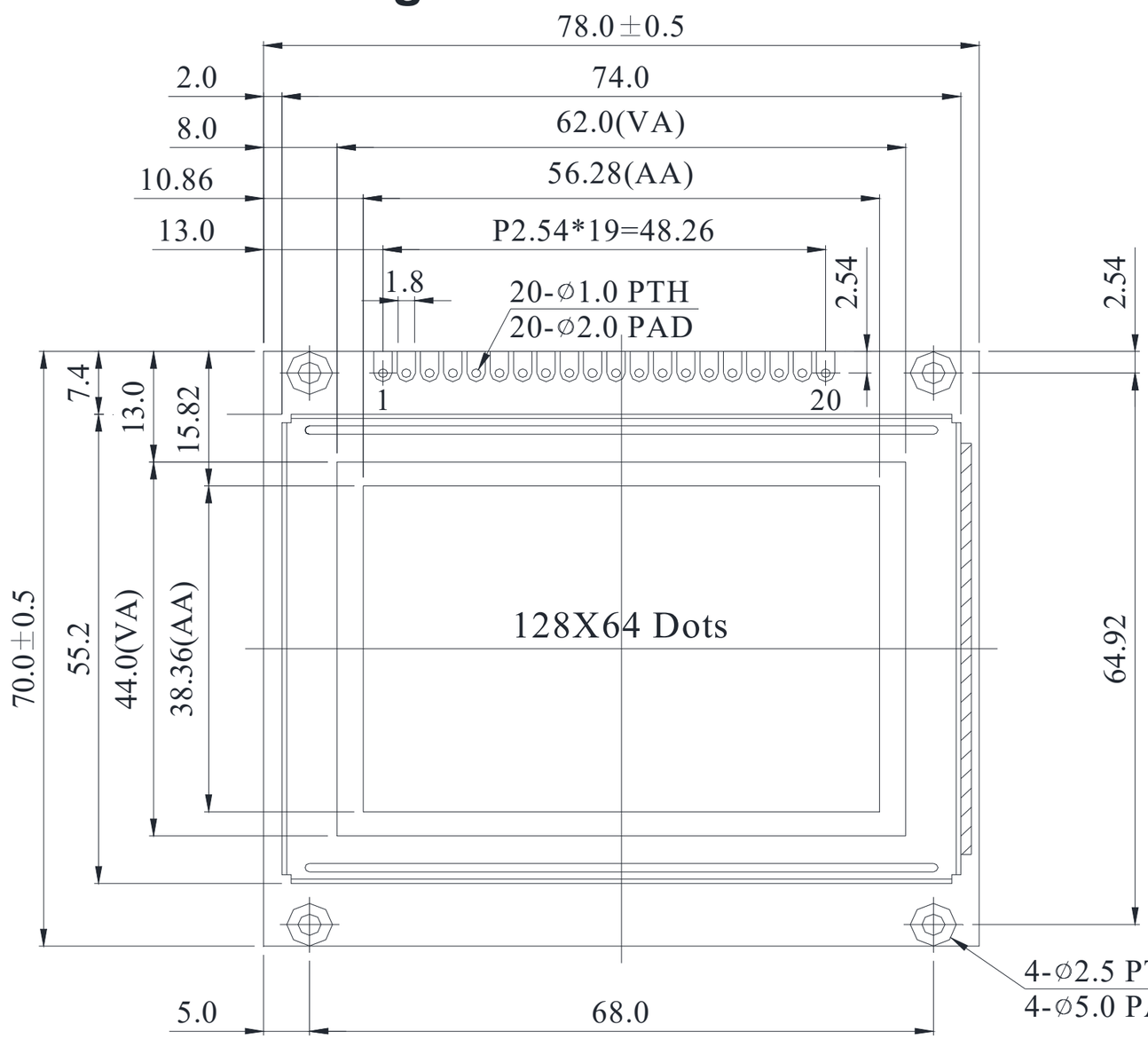
Additional Resources

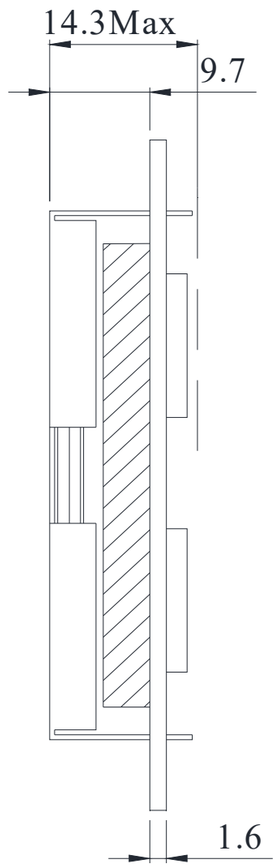
- **Support Forum:** https://support.newhavendisplay.com/hc/en-us/community/topics
- **GitHub:** https://github.com/newhavendisplay
- **Example Code:** https://support.newhavendisplay.com/hc/en-us/categories/4409527834135-Example-Code/
- **Knowledge Center:** https://www.newhavendisplay.com/knowledge_center.html
- **Quality Center:** https://www.newhavendisplay.com/quality_center.html
- **Precautions for using LCDs/LCMs:** https://www.newhavendisplay.com/specs/precautions.pdf
- **Warranty / Terms & Conditions:** https://www.newhavendisplay.com/terms.html

Document Revision History

Revision	Date	Description	Changed By
0	01/25/2008	Initial Release	-
1	11/24/2008	Backlight Modification	-
2	08/11/2009	User Guide Reformat	BE
3	03/23/2010	Electrical/Pin Description Update	BE
4	12/27/2010	Pin Description Update	AK
5	12/19/2012	Datasheet Reformatted	AK
6	12/22/2014	Electrical Characteristics Updated	PB
7	02/28/2017	Mechanical Drawing & Electrical Characteristics Updated	SB
8	03/03/2021	2D Mechanical Drawing Redesign; Added MIN Supply Current & Updated Quality Information	AS
9	07/11/2023	IC Changed to NT7108T	KL

Mechanical Drawing



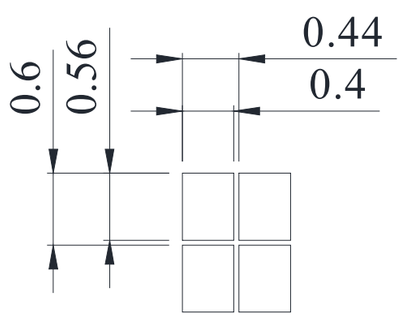


Newhaven Display
NHD-12864WG-CTFH-V#N
Date Code

Part Label (type/format may vary)

Pin Assignment

PIN NO.	SYMBOL
1	$\overline{CS1}$
2	$\overline{CS2}$
3	VSS
4	VDD
5	V0
6	D/I
7	R/$\overline{W}$
8	E
9	DB0
10	DB1
11	DB2
12	DB3
13	DB4
14	DB5
15	DB6
16	DB7
17	RST
18	VEE
19	A
20	K



Product Description: 128x64 Graphic LCD

1. Driver IC: NT7108T
2. Drivnig Mode: 1/64 Duty
3. Interface: 6800 Parallel
4. Power Requirement: 5.0V LCD
5. Optical Features: FSTN (+), Transflective, 6:00 View, White Backlight

Standard Tolerance:
(Unless otherwise specified)
Linear: ±0.3mm

NEWHAVEN DISPLAY INTERNATIONAL

Drawing/Part Number: NHD-12864WG-CTFH-V#N
Revision: -

Unless otherwise specified:
• Dimensions are in Millimeters
• Third Angle Projection

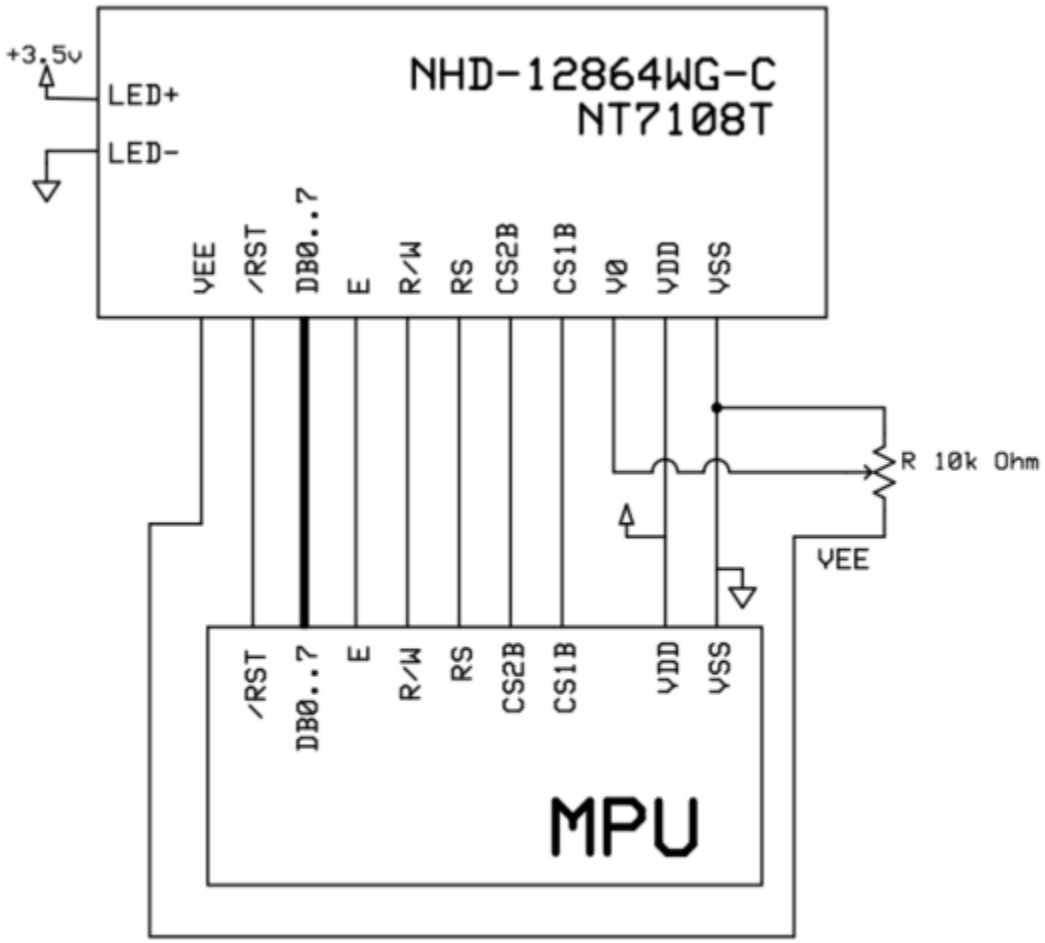
Drawn By: K. Lewis
Approved By: K. Lewis
Drawn Date: 07/11/2023
Approved Date: 07/11/2023

Pin Description

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	V_{SS}	Power Supply	Ground
4	V_{DD}	Power Supply	Supply Voltage for logic (+5.0V)
5	V_0	Adj. Power Supply	Supply 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	V_{EE}	Power Supply	Negative voltage output (-4V)
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**: -

Wiring Diagram



Electrical Characteristics

Item	Symbol	Condition	Min.	Typ.	Max.	Unit
Operating Temperature Range	T_{OP}	Absolute Max	-20	-	+70	°C
Storage Temperature Range	T_{ST}	Absolute Max	-30	-	+80	°C
Supply Voltage	V_{DD}	-	4.5	5.0	5.5	V
Supply Current	I_{DD}	V_{DD} = 5.0V	2	4	8	mA
Supply for LCD (contrast)	V_{LCD}	T_{OP} = 25°C	8.2	8.5	8.8	V
"H" Level input	V_{IH}	-	0.7 * V_{DD}	-	V_{DD}	V
"L" Level input	V_{IL}	-	V_{SS}	-	0.3 * V_{DD}	V
"H" Level output	V_{OH}	-	2.4	-	V_{DD}	V
"L" Level output	V_{OL}	-	V_{SS}	-	0.4	V
Backlight Supply Voltage	V_{LED}	-	3.4	3.5	3.6	V
Backlight Supply Current	I_{LED}	V_{LED} = 3.5V	20	64	80	mA

The LED of the Backlight is driven by current drain; drive voltage is for reference only. Drive voltage must be selected to ensure backlight current drain is below MAX level stated.

Optical Characteristics

Item		Symbol	Condition	Min.	Typ.	Max.	Unit
Optimal Viewing Angles	Top	φY+	CR ≥ 2	-	30	-	°
	Bottom	φY-		-	60	-	°
	Left	θX-		-	45	-	°
	Right	θX+		-	45	-	°
Contrast Ratio		CR	-	2	5	-	-
Response Time	Rise	T_R	T_{OP} = 25°C	-	200	300	ms
	Fall	T_F		-	250	350	ms

Controller Information

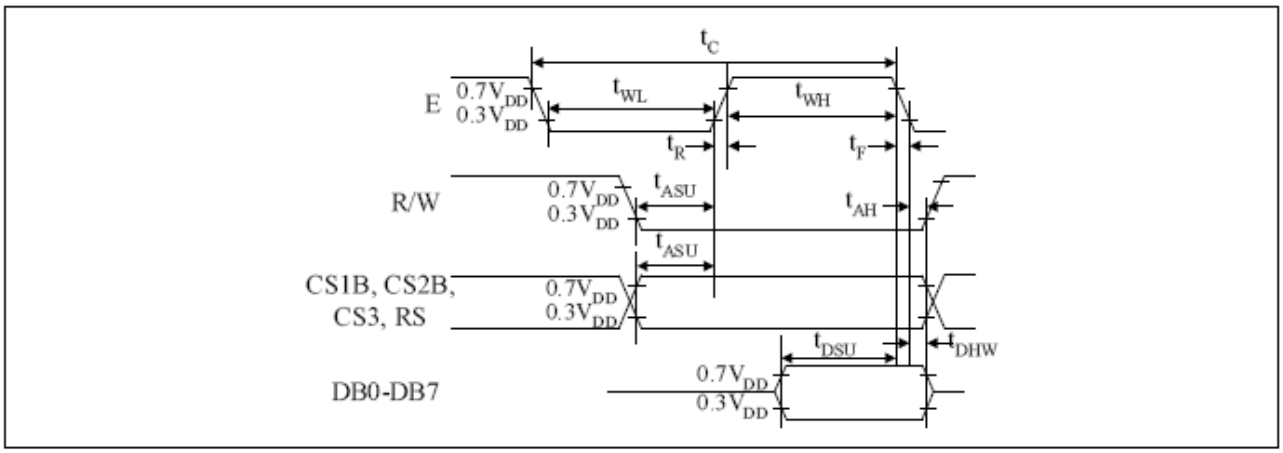
Built-in NT7108T Controller: https://support.newhavendisplay.com/hc/en-us/articles/4414581839895-NT7108

Table of Commands

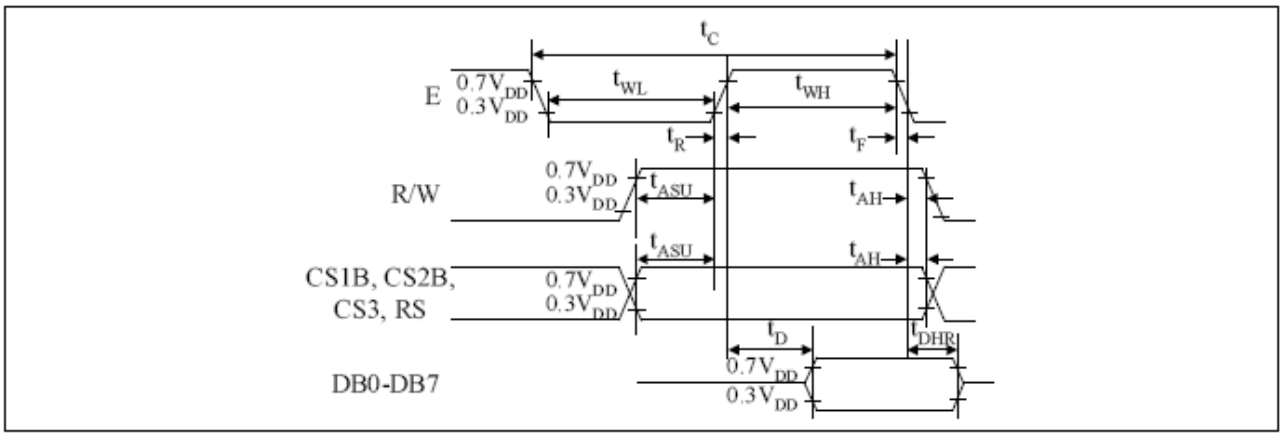
Instruction	RS	R/W	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0	Function
Display on/off	L	L	L	L	H	H	H	H	H	L/H	Controls the display on or off. Internal status and display RAM data is not affected. L:OFF, H:ON
Set address (Y address)	L	L	L	H	Y address (0-63)						Sets the Y address in the Y address counter.
Set page (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	tC	1000	-	-	ns
E high level width	tWH	450	-	-	
E low level width	tWL	450	-	-	
E rise time	tR	-	-	25	
E fall time	tF	-	-	25	
Address set-up time	tASU	140	-	-	
Address hold time	tAH	10	-	-	
Data set-up time	tDSU	200	-	-	
Data delay time	tD	-	-	320	
Data hold time (write)	tDHW	10	-	-	
Data hold time (read)	tDHR	20	-	-	



MPU Write Timing



MPU Read Timing

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);
}
```

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 Storage	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, 1.5mm amplitude. 60 sec in each of 3 directions X,Y,Z For 15 minutes	3
Static electricity test	Endurance test applying electric static discharge.	Air: ±800V 150pF/330Ω, 10 Times Contact: ±600V 150pF/330Ω, 10 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.