NHD-12864MZ-FSW-GBW-L

Graphic Liquid Crystal Display Module

NHD-	Newhaven Display
12864-	128 x 64 Pixels
MZ-	Model
F-	Transflective
SW-	Side White LED Backlight
G-	STN Positive Gray
B-	6:00 Optimal View
W-	Wide Temperature
L-	Low Power
	RoHS Compliant

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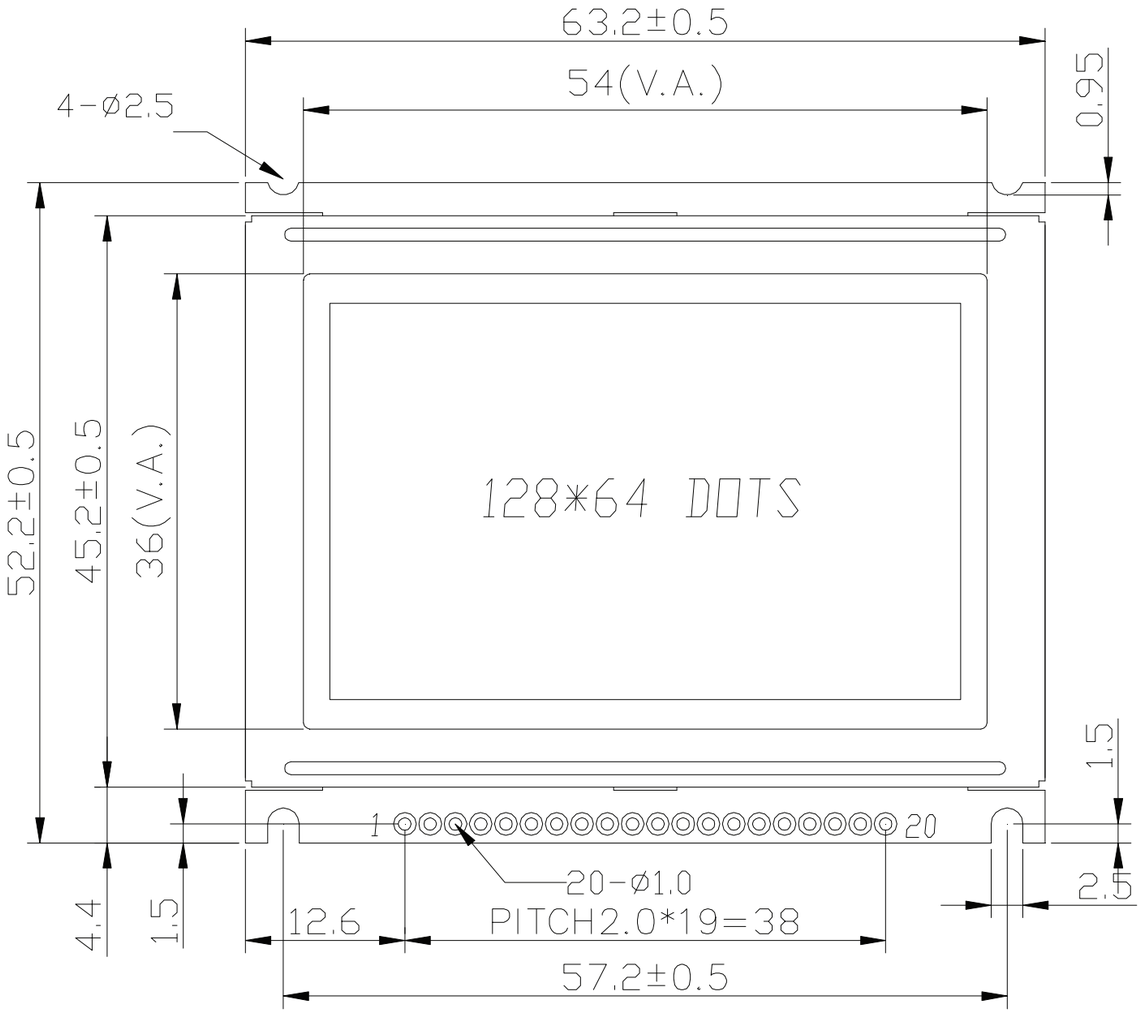
Document Revision History

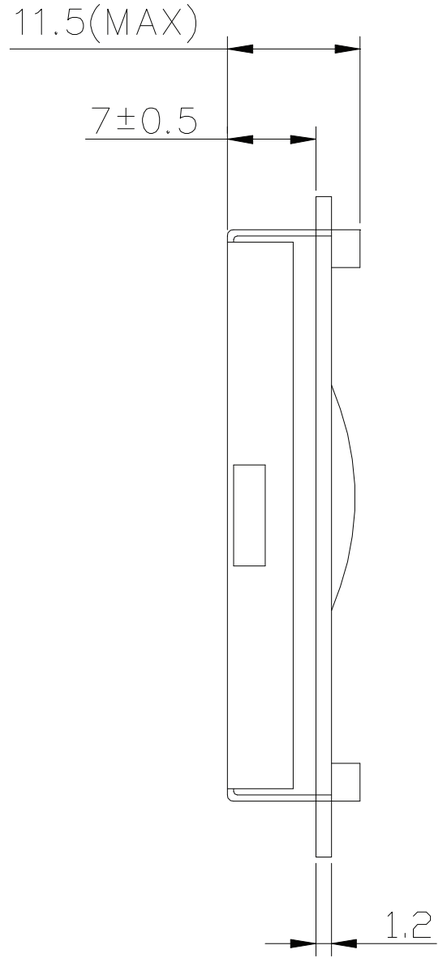
Revision	Date	Description	Changed by
0	12/8/08	Initial Release	-
1	3/17/10	User guide reformat	BE
2	3/19/10	Mechanical Drawing updated	BE
3	4/14/10	Block diagram/initialization updated	BE
4	5/13/10	Pin Description updated	BE
5	12/17/12	Controller information updated	AK
6	12/7/16	Electrical & Optical Characteristics Updated	SB
7	1/11/17	Mechanical Drawing and Electrical Characteristics Updated	TM
8	5/2/18	Mechanical Drawing & Electrical Characteristics Updated	SB

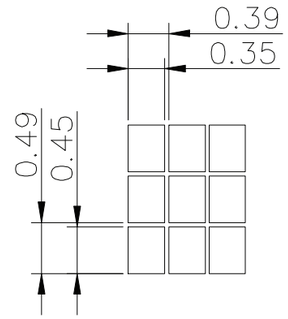
Functions and Features

- **128 x 64 pixels**
- **Built-in NT7108C controller**
- **+5.0V power supply**
- **1/64 duty cycle, 1/9 bias**
- **RoHS Compliant**

SYMBOL	REVISION	DATE







Pin Assignment

1	VDD
2	VSS
3	V0
4	DB0
5	DB1
6	DB2
7	DB3
8	DB4
9	DB5
10	DB6
11	DB7
12	CS2
13	CS1
14	RST
15	R/W
16	DI
17	E
18	VSS
19	LED+
20	LED-

Notes:

1. Driver:	1/64 Duty, 1/9 Bias
2. Display Mode:	STN Positive / Gray / Transflective
3. Optimal View:	6:00
4. Voltage:	5.0V VDD, 8.3V VLCD
5. Backlight:	White LED
6. Driver IC:	NT7108C

STANDARD TOLERANCES
(UNLESS OTHERWISE SPECIFIED)
LINEAR:
XX. ±0.3 mm
XX.X ±0.3 mm
XX.XX ±0.3 mm

UNLESS OTHERWISE SPECIFIED
- DIMENSIONS ARE IN MILLIMETERS
- THIRD ANGLE PROJECTION

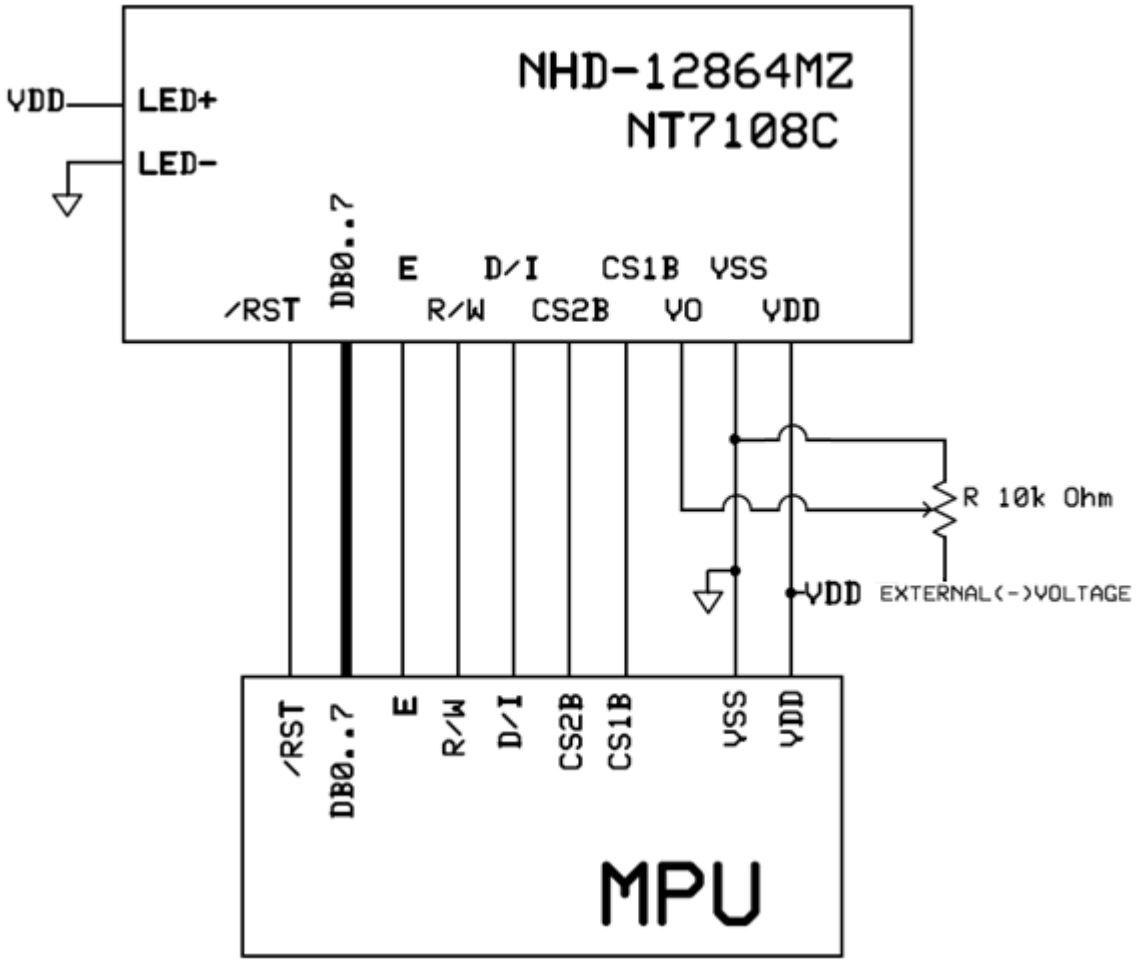
NEWHAVEN DISPLAY INTERNATIONAL

DRAWING/PART NUMBER: NHD-12864MZ-FSW-GBW-L			REVISION: 1.0
DRAWN BY: S. Baxi	CHECKED BY: S. Baxi	APPROVED BY: T. Tung	SIZE: A3
DRAWN DATE: 05/02/18	CHECKED DATE: 05/02/18	APPROVED DATE: 05/02/18	SCALE: NS
DO NOT SCALE DRAWING		SHEET 1 OF 1	

Pin Description and Wiring Diagram

Pin No.	Symbol	External Connection	Function Description
1	V_{DD}	Power Supply	Supply Voltage for logic (+5.0V)
2	V_{SS}	Power Supply	Ground
3	V_0	Adj. Power Supply	Supply Voltage for contrast (approx. -3.3V)
4-11	DB0-DB7	MPU	Bi-directional 8-bit data bus
12	CS2B	MPU	Active LOW Chip Select Signal for RIGHT half of LCD
13	CS1B	MPU	Active LOW Chip Select Signal for LEFT half of LCD
14	/RST	MPU	Active LOW Reset signal
15	R/W	MPU	Read/Write select signal. R/W=1: Read R/W: =0: Write
16	RS	MPU	Register Select: 1=Data, 0=Instruction
17	E	MPU	Operation Enable signal. Falling edge triggered.
18	VSS	Power Supply	Ground
19	LED+	Power Supply	Backlight Anode (+5.0V via on-board resistor)
20	LED-	Power Supply	Backlight Cathode (Ground)

Recommended LCD connector: 2.0mm pitch pins
Backlight connector: - **Mates with**: -



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}	-	4.8	5.0	5.2	V
Supply Current	I_{DD}	V_{DD} = 5.0V	0.5	1.5	3.5	mA
Supply for LCD (contrast)	V_{LCD}	T_{OP} = 25°C	7.8	8.3	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}	-	4.8	5.0	5.2	V
Backlight Supply Current	I_{LED}	V_{LED} = 5.0V	20	30	40	mA

Optical Characteristics

Item		Symbol	Condition	Min.	Typ.	Max.	Unit
Optimal Viewing Angles	Top	φY+	CR ≥ 2	-	30	-	°
	Bottom	φY-		-	40	-	°
	Left	θX-		-	30	-	°
	Right	θX+		-	30	-	°
Contrast Ratio		CR	-	2	5	-	-
Response Time	Rise	T_R	T_{OP} = 25°C	-	150	250	ms
	Fall	T_F		-	200	300	ms

Controller Information

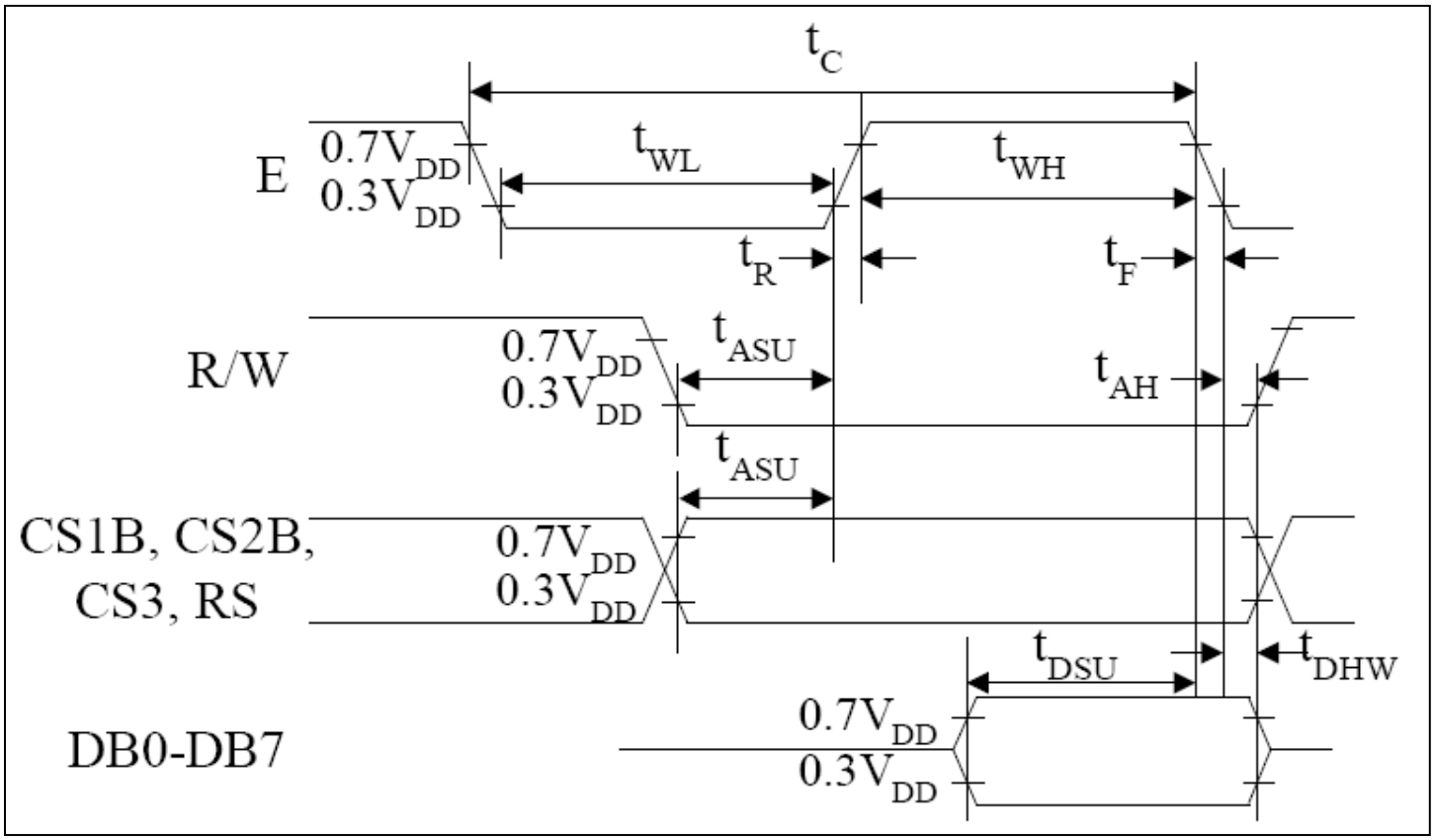
Built-in NT7108C controller.

Please download specification at http://www.newhavendisplay.com/app_notes/NT7108.pdf

Table of Commands

Instruction	RS	RW	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0	Function
Read Display Data	1	1	Read data								Reads data (DB[7:0])from display data RAM to the data bus.
Write Display Data	1	0	Write data								Writes data (DB[7:0]) into display data RAM. After writing instruction, Y address is incriminated by 1 automatically
Status Read	0	1	Busy	0	ON/ OFF	Re-set	0	0	0	0	Reads the internal status BUSY 0: Ready 1: In operation ON/OFF 0: Display ON 1: Display OFF RESET 0: Normal 1: Reset
Set Address (Y address)	0	0	0	1	Y address (0~63)						Sets the Y address in the Y address counter
Set Display Start Line	0	0	1	1	Display start line (0~63)						Indicates the display data RAM displayed at the top of the screen.
Set Address (X address)	0	0	1	0	1	1	1	Page (0~7)			Sets the X address at the X address register.
Display On/off	0	0	0	0	1	1	1	1	1	0/1	Controls the display ON or OFF. The internal status and the DDRAM data is not affected. 0: OFF, 1: ON

Timing Characteristics



Characteristic	Symbol	Min	Type	Max	Unit
E cycle	t_C	1000	-	-	ns
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	-	-	
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	-	-	

Example Initialization Program

```
'--------------------------------------------------------------------------------
'DB0-DB7   7-14              P1
'CS2       16                P3.6
'CS1       15                P3.1
'RST       17                P3.2
'R/W       5                 P3.7
'D/I       4                 P3.0
'E         6                 P3.4
'--------------------------------------------------------------------------------
Sub Init
 Reset P3.2
 Set P3.2
 Reset P3.4
 Reset P3.0
 Reset P3.7
 Reset P3.6
 Reset P3.1
 A = &H3F
 Call Comleft                                              'display on
 Call Comright                                             'display on
End Sub
'--------------------------------------------------------------------------------
Sub Comleft
 P1 = A
 Set P3.6
 Reset P3.0
 Set P3.4
 Reset P3.4
 Reset P3.6
End Sub

Sub Comright
 P1 = A
 Set P3.1
 Reset P3.0
 Set P3.4
 Reset P3.4
 Reset P3.1
End Sub

Sub Writeleft
 P1 = A
 Set P3.6
 Set P3.0
 Set P3.4
 Reset P3.4
 Reset P3.6
End Sub

Sub Writeright
 P1 = A
 Set P3.1
 Set P3.0
 Set P3.4
 Reset P3.4
 Reset P3.1
End Sub
```

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 , 48hrs	2
Low Temperature storage	Endurance test applying the low storage temperature for a long time.	-30°C , 48hrs	1,2
High Temperature Operation	Endurance test applying the electric stress (voltage & current) and the high thermal stress for a long time.	+70°C , 48hrs	2
Low Temperature Operation	Endurance test applying the electric stress (voltage & current) and the low thermal stress for a long time.	-20°C , 48hrs	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.	+40°C , 90% RH , 48hrs	1,2
Thermal Shock resistance	Endurance test applying the electric stress (voltage & current) during a cycle of low and high thermal stress.	0°C, 30min -> 25°C, 5min -> 50°C, 30min = 1 cycle For 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.	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