

NHD-12864AZ-NSW-BBW-TR

Graphic Liquid Crystal Display Module

NHD-	Newhaven Display
12864-	128 x 64 pixels
AZ-	Model
N-	Transmissive
SW-	Side White LED backlight
B-	STN- Blue (-)
B-	6:00 View
W-	Wide Temperature (-20°C ~ +70°C)
TR-	Temperature Compensation Contrast Circuit

RoHS Compliant

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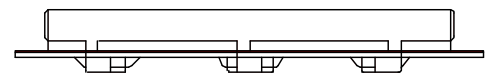
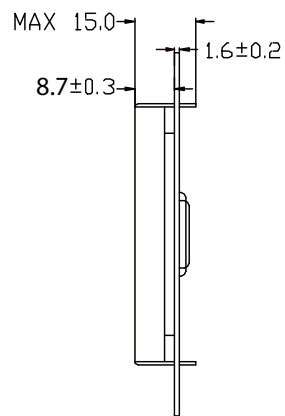
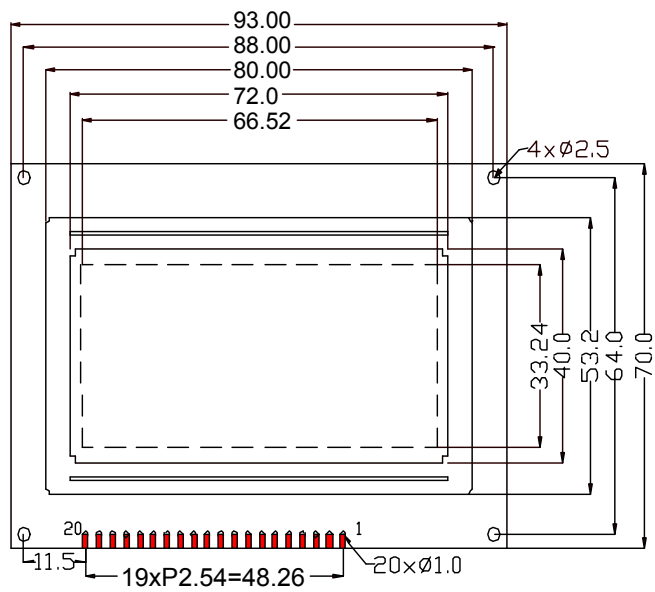
Document Revision History

Revision	Date	Description	Changed by
0	11/15/2008	Initial Release	-
1	8/25/2009	User guide reformat	BE
2	3/24/2010	Mechanical Drawing/Pin Description updated	BE
3	5/20/2010	Updated Pin Description and Electrical Characteristics	MC

Functions and Features

- 128x64 pixels
- Built-in KS0108 Controller
- +5.0V power supply
- 1/64 duty, 1/9 bias
- Built-in Negative voltage
- Built-in Temp Compensation Circuit

Mechanical Drawing



PIN	1	2	3	4	5	6	7	8	9	10
SIGNAL	Vss	VDD	V0	D/I	R/W	E	DB0	DB1	DB2	DB3
PIN	11	12	13	14	15	16	17	18	19	20
SIGNAL	DB4	DB5	DB6	DB7	CS1	CS2	RES	VEE	A	K

*NOTE: .All units are mm.

Newhaven Display

Part No.

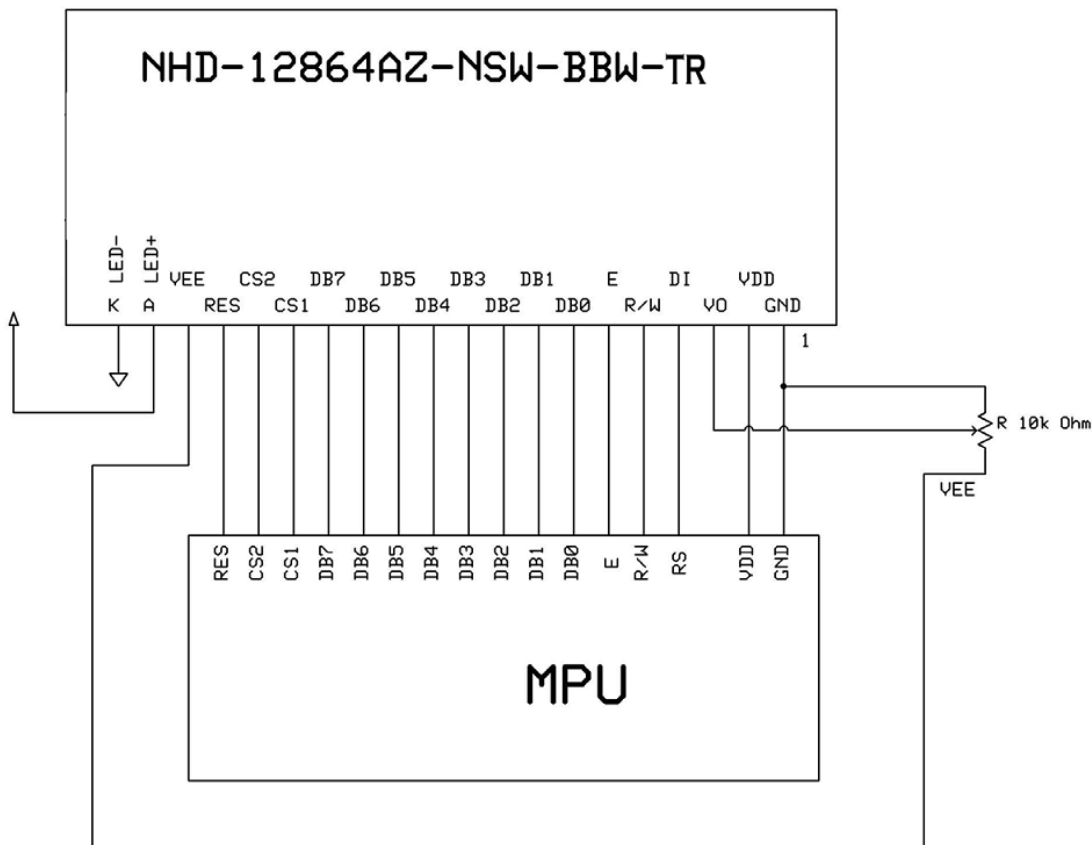
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Pin Description and Wiring Diagram

Pin No.	Symbol	External Connection	Function Description
1	VSS	Power Supply	Ground
2	VDD	Power Supply	Power supply for Logic (+5.0V)
3	VO	Adj Power Supply	Power Supply for contrast (approx. -3.7V)
4	D/I	MPU	Register select: 1=Data, 0=Instruction
5	R/W	MPU	Read/Write select signal, R/W=1: Read R/W: =0: Write
6	E	MPU	Operation enable signal. Falling edge triggered.
7-14	DB0-DB7	MPU	This is an 8-bit-directional data bus
15	CS1	MPU	Chip Selection: CS1=H, CS2=L → select IC1 (left side) CS1=L, CS2=H → select IC2 (right side)
16	CS2	MPU	
17	/RST	MPU	Active LOW Reset signal
18	VEE	Power Supply	Negative voltage output (-5.0V)
19	LED+	Power Supply	Power for LED backlight (+5.0V via 51Ω on-board resistor)
20	LED-	Power Supply	Ground for Backlight

Recommended LCD connector: 2.54mm pitch pins

Backlight connector: on LCD connector



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		4.7	5.0	5.5	V
Supply Current	IDD	Ta=25°, VDD=5.0V		3.5	5.5	mA
Supply for LCD (contrast)	VDD-V0	Ta=25°		8.7		V
"H" Level input	Vih		2.2		VDD	V
"L" Level input	Vil		0		0.6	V
"H" Level output	Voh		2.4			V
"L" Level output	Vol				0.4	V
Backlight Supply Voltage	Vled		-	5.0	-	V
Backlight Supply Current	Iled	Vled=5.0V, R=68Ω	-	30	50	mA

Optical Characteristics

Item	Symbol	Condition	Min.	Typ.	Max.	Unit
Viewing Angle - Vertical (top)	AH	Cr ≥ 2	-	20	-	°
Viewing Angle- Vertical (bottom)	AH	Cr ≥ 2	-	40	-	°
Viewing Angle- Horizontal (left)	AV	Cr ≥ 2	-	35	-	°
Viewing Angle - Horizontal (right)	AV	Cr ≥ 2	-	35	-	°
Contrast Ratio	Cr			10		
Response Time (rise)	Tr			200	250	ms
Response Time (fall)	Tf			300	350	ms

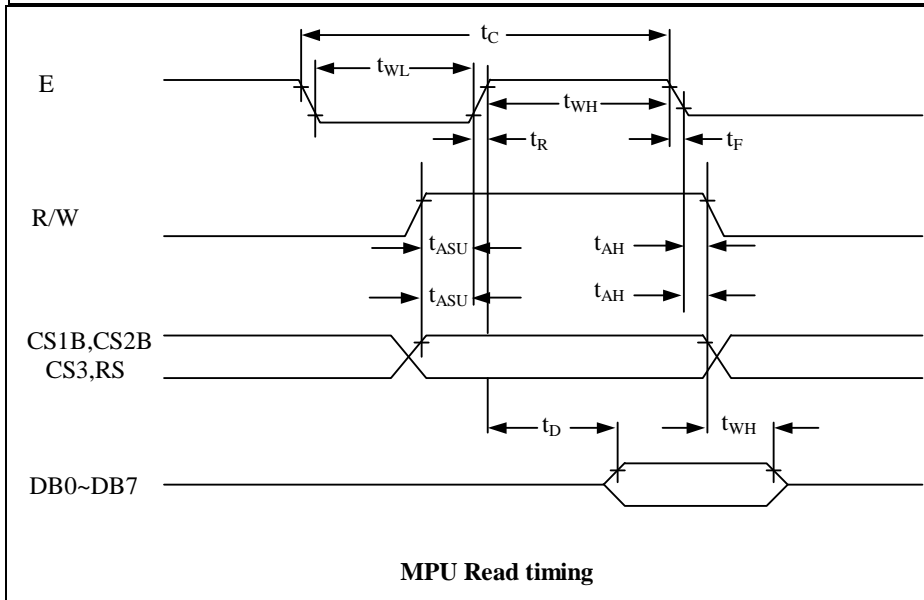
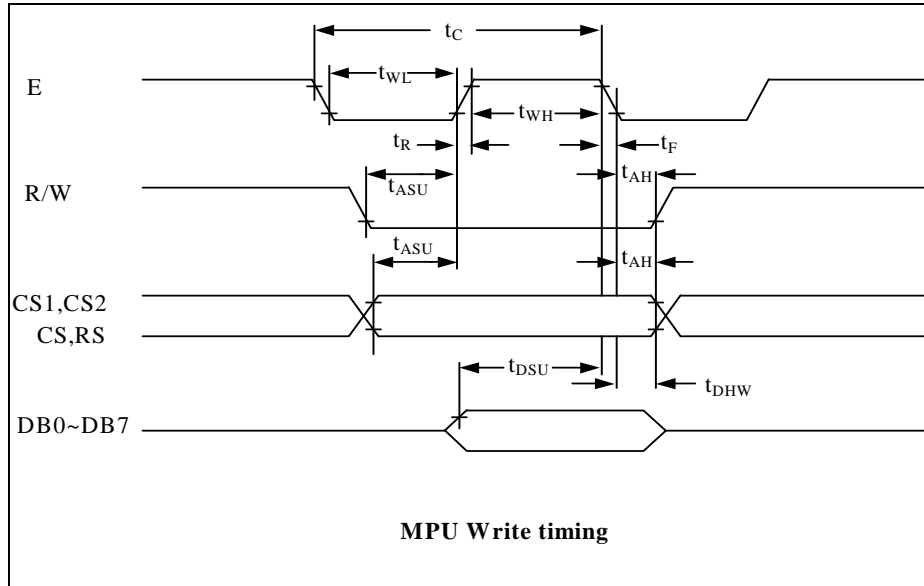
Controller Information

Built-in KS0108B. Download specification at http://www.newhavendisplay.com/app_notes/KS0108.pdf

Table of Commands

Instruction	RS	RW	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0	Function
Read Display Date	1	1	Read data								Reads data (DB[7:0]) from display data RAM to the data bus.
Write Display Date	1	0	Write data								Writes data (DB[7:0]) into the DDRAM. After writing instruction, Y address is incremented 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 at the column 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	Typ	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_{SU}	200	-	-	
Data Delay Time	t_D	-	-	320	
Data Hold Time (Write)	t_{DHW}	10	-	-	
Data Hold Time (Read)	t_{DHR}	20	-	-	

Example Initialization Program

```
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 Writerright
  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 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