NHD-0216K1Z-FL-YBW

Character Liquid Crystal Display Module

NHD-	Newhaven Display
0216-	2 Lines x 16 Characters
K1Z-	Model
F-	Transflective
L-	Yellow/Green LED Backlight
Y-	STN- Yellow/Green
B-	6:00 Optimal View
W-	Wide Temperature
	RoHS Compliant

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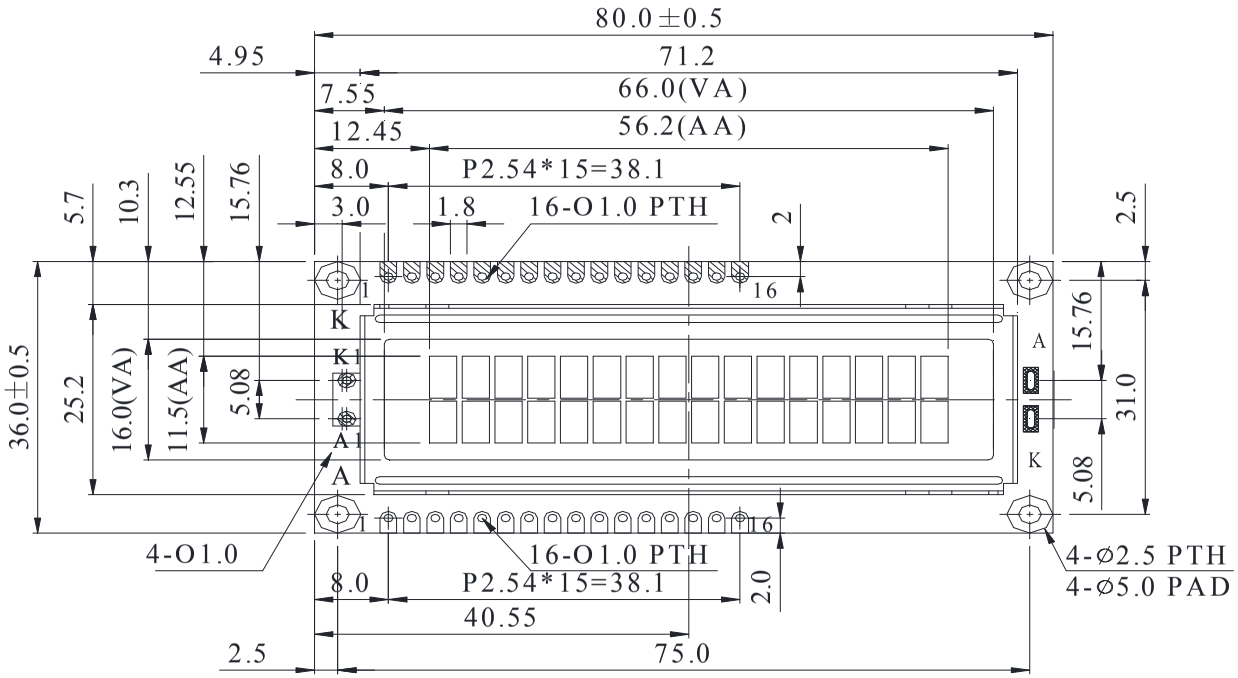
Document Revision History

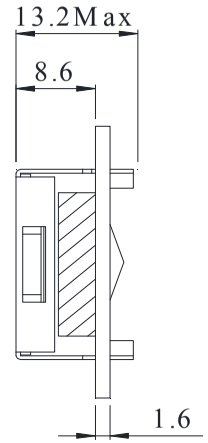
Revision	Date	Description	Changed by
0	10/5/07	Initial Release	-
1	10/9/09	User Guide Reformat	BE
2	10/23/09	Block Diagram Revision	BE
3	12/8/09	Pin description/backlight updated	BE
4	1/7/10	Optical updated	BE
5	1/6/11	Alternate controller information updated	AK
6	4/6/11	Mechanical drawing updated	AK
7	4/8/11	Electrical/Optical characteristics & Pin Description updated	AK
8	12/15/15	Electrical Characteristics updated, Timing characteristics added	SB
9	1/22/18	Backlight Characteristics Updated	SB
10	3/26/18	Backlight Current Updated	SB

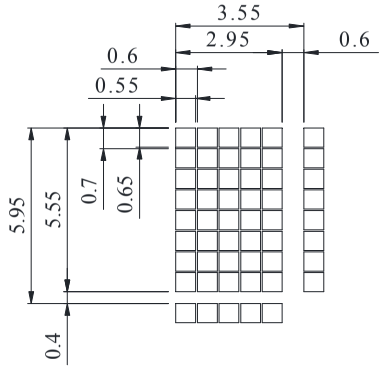
Functions and Features

- **2 lines x 16 characters**
- **Built-in controller (ST7066U)**
- **+5.0V Power Supply**
- **1/16 duty, 1/5 bias**
- **RoHS compliant**

SYMBOL	REVISION	DATE







Pin Assignment

PIN NO.	SYMBOL
1	Vss
2	Vdd
3	Vo
4	RS
5	R/$\overline{W}$
6	E
7	DB0
8	DB1
9	DB2
10	DB3
11	DB4
12	DB5
13	DB6
14	DB7
15	A
16	K

Notes:

1. Driver:	1/16 Duty, 1/5 Bias
2. Voltage:	5.0V VDD, 3.7V VLCD
3. Display Mode:	STN Positive / Yellow-Green / Transflective
4. Optimal View:	6:00
5. Backlight:	Yellow-Green LED
6. Driver IC:	ST7066U 8/4-Bit MPU Interface

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-0216K1Z-FL-YBW
REVISION: 1.0
SIZE: A3
SCALE: NS

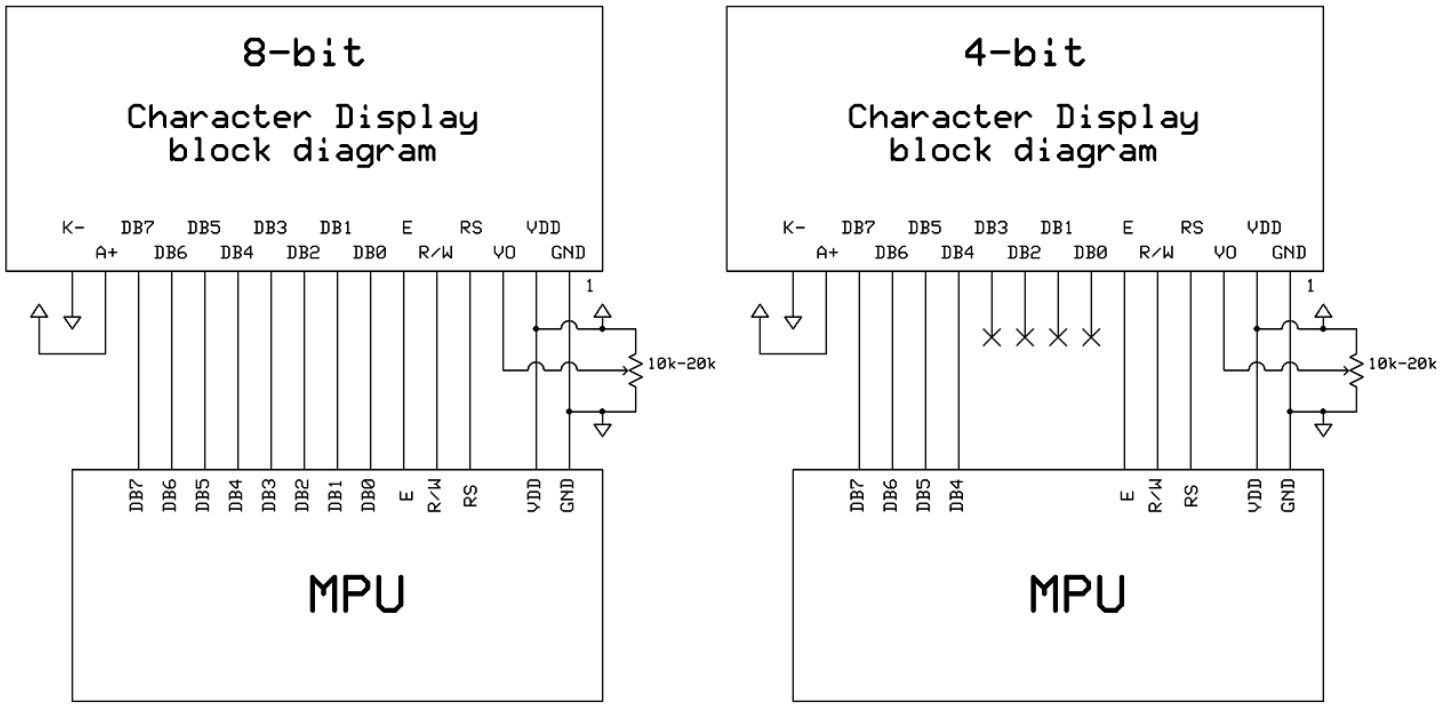
DRAWN BY:	CHECKED BY:	APPROVED BY:
S. Baxi	S. Baxi	T. Tung
DRAWN DATE:	CHECKED DATE:	APPROVED DATE:
01/22/18	01/22/18	01/22/18

DO NOT SCALE DRAWING | SHEET 1 OF 1

Pin Description and Wiring Diagram

Pin No.	Symbol	External Connection	Function Description
1	V_{SS}	Power Supply	Ground
2	V_{DD}	Power Supply	Supply Voltage for logic (+5.0V)
3	V_0	Adj. Power Supply	Supply Voltage for contrast (approx. 1.3V)
4	RS	MPU	Register Select signal. RS=0: Command, RS=1: Data
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.
7-10	DB0 – DB3	MPU	Four low order bi-directional three-state data bus lines. These four are not used during 4-bit operation.
11-14	DB4 – DB7	MPU	Four high order bi-directional three-state data bus lines.
15	LED+	Power Supply	Backlight Anode(+5.0V via on-board resistor)
16	LED-	Power Supply	Backlight Cathode (Ground)

Recommended LCD connector: 2.54mm pitch pins
Backlight connector: --- **Mates with:** ---



Electrical Characteristics

Item	Symbol	Condition	Min.	Typ.	Max.	Unit
Operating Temperature Range	T_{OP}	Absolute Max	-20	-	+70	ºC
Storage Temperature Range	T_{ST}	Absolute Max	-30	-	+80	ºC
Supply Voltage	V_{DD}	-	4.5	5.0	5.5	V
Supply Current	I_{DD}	V_{DD} = 5.0V	0.5	1.0	3.0	mA
Supply for LCD (contrast)	V_{LCD}	T_{OP} = 25°C	3.5	3.7	3.9	V
"H" Level input	V_{IH}	-	0.7 * V_{DD}	-	V_{DD}	V
"L" Level input	V_{IL}	-	V_{SS}	-	0.6	V
"H" Level output	V_{OH}	-	3.9	-	V_{DD}	V
"L" Level output	V_{OL}	-	V_{SS}	-	0.4	V
Backlight Supply Voltage	V_{LED}	-	4.9	5.0	5.1	V
Backlight Supply Current	I_{LED}	V_{LED} = 5.0 V	65	130	156	mA

Optical Characteristics

Item		Symbol	Condition	Min.	Typ.	Max.	Unit
Optimal Viewing Angles	Top	φY+	Cr ≥ 2	-	20	-	º
	Bottom	φY-		-	40	-	º
	Left	θX-		-	30	-	º
	Right	θX+		-	30	-	º
Contrast Ratio		Cr	-	-	3	-	-
Response Time	Rise	T_R	-	-	150	200	ms
	Fall	T_F	-	-	150	200	ms

Controller Information

Built-in ST7066U Controller.
Please download specification at http://www.newhavendisplay.com/app_notes/ST7066U.pdf

DDRAM Address

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
00	01	02	03	04	05	06	07	08	09	0A	0B	0C	0D	0E	0F
40	41	42	43	44	45	46	47	48	49	4A	4B	4C	4D	4E	4F

Table of Commands

Instruction	Instruction code										Description	Execution time (fosc= 270 KHZ
	RS	R/W	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0		
Clear Display	0	0	0	0	0	0	0	0	0	1	Write “20H” to DDRAM and set DDRAM address to “00H” from AC	1.52ms
Return Home	0	0	0	0	0	0	0	0	1	-	Set DDRAM Address to “00H” from AC and return cursor to its original position if shifted. The contents of DDRAM are not changed.	1.52ms
Entry mode Set	0	0	0	0	0	0	0	1	I/D	SH	Sets cursor move direction and specifies display shift. These parameters are performed during data write and read.	37μs
Display ON/ OFF control	0	0	0	0	0	0	1	D	C	B	D=1: Entire display on C=1: Cursor on B=1: Blinking cursor on	37μs
Cursor or Display shift	0	0	0	0	0	1	S/C	R/L	-	-	Sets cursor moving and display shift control bit, and the direction without changing DDRAM data.	37μs
Function set	0	0	0	0	1	DL	N	F	-	-	DL: Interface data is 8/4 bits N: Number of lines is 2/1 F: Font size is 5x11/5x8	37μs
Set CGRAM Address	0	0	0	1	AC5	AC4	AC3	AC2	AC1	AC0	Set CGRAM address in address counter	37μs
Set DDRAM Address	0	0	1	AC6	AC5	AC4	AC3	AC2	AC1	AC0	Set DDRAM address in address counter.	37μs
Read busy Flag and Address	0	1	BF	AC6	AC5	AC4	AC3	AC2	AC1	AC0	Whether during internal operation or not can be known by reading BF. The contents of address counter can also be read.	0s
Write data To Address	1	0	D7	D6	D5	D4	D3	D2	D1	D0	Write data into internal RAM (DDRAM/CGRAM).	37μs
Read data From RAM	1	1	D7	D6	D5	D4	D3	D2	D1	D0	Read data from internal RAM (DDRAM/CGRAM).	37μs