NHD-C0220AA-FSW-FTW

COG (Chip-on-Glass) Liquid Crystal Display Module

NHD-	Newhaven Display
C0220-	COG, 2 lines x 20 characters
AA-	Model
F-	Transflective
SW-	Side White LED backlight
F-	FSTN+
T-	12:00 View Angle
W-	Wide Temp (-20°C ~ +70°C)
	RoHS Compliant

Newhaven Display International, Inc.
2511 Technology Drive, Suite 101
Elgin IL, 60124
Ph: 847-844-8795 Fax: 847-844-8796

www.newhavendisplay.com
nhtech@newhavendisplay.com nhsales@newhavendisplay.com

Document Revision History

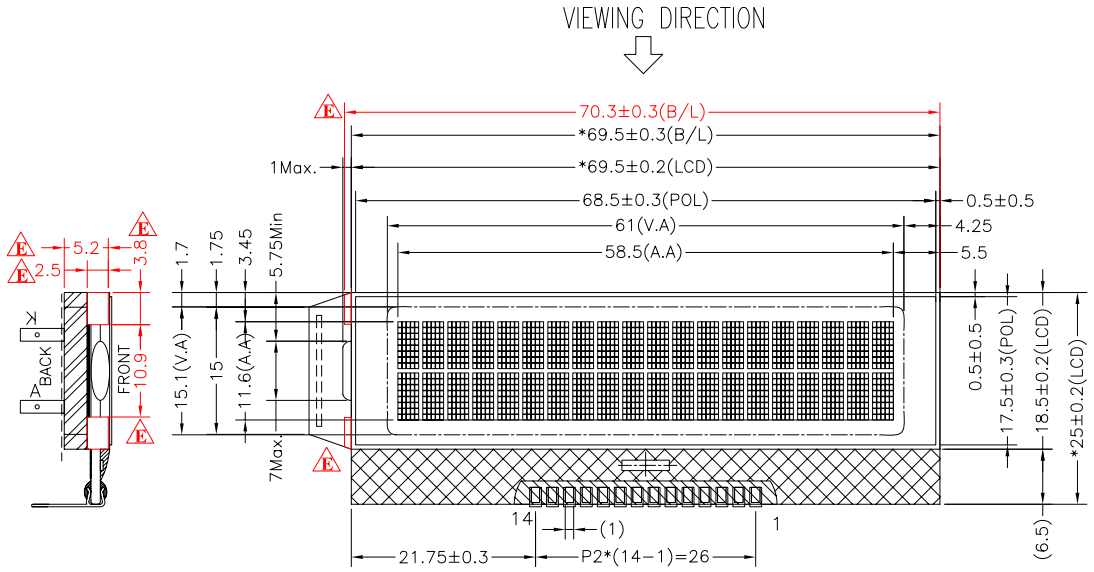
Revision	Date	Description	Changed by
0	11/5/2010	Initial Release	-
1	5/27/2011	Display character address code updated	AK
2	6/2/2011	Timing characteristics updated	AK

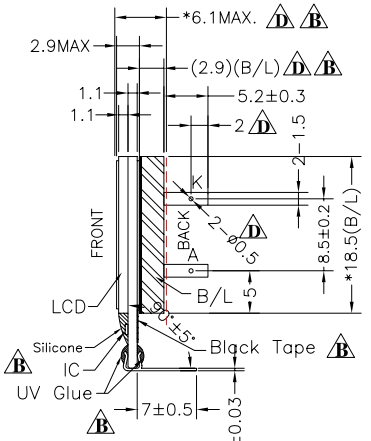
Functions and Features

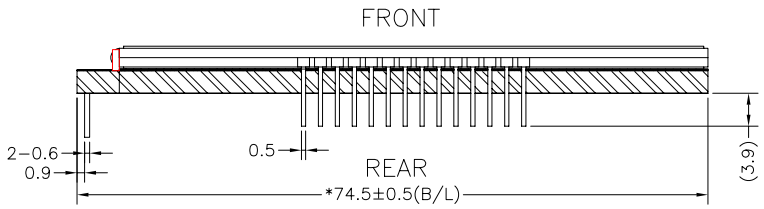
- **2 lines x 20 characters**
- **Built-in NT7605 controller**
- **3.3V power supply**
- **1/16 duty, 1/5 bias**

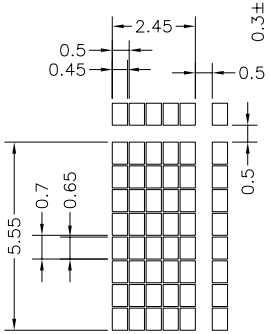
Mechanical Drawing

REV	DESCRIPTION	DATE 日期
A	First issue	Aug-20-2010
B	Revise design	Aug-23-2010
C	Updete VLCD 4.6V to 3.2V	Aug-30-2010
D	Update dimension according as customer sample	Sep-06-2010
E	Update Backlight frame	Nov-02-2010









DOTS SIZE
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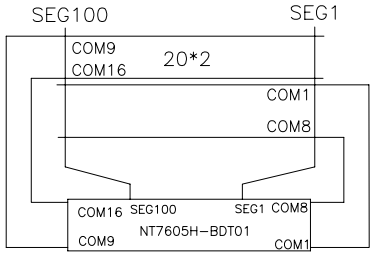


COM&SEG LAYOUT

PIN	1	2	3	4	5	6	7
CONNECTION	GND	V5	VDD	RS	R/W	E	DB0
PIN	8	9	10	11	12	13	14
CONNECTION	DB1	DB2	DB3	DB4	DB5	DB6	DB7

Specification:

C 1). Driving: Duty:1/16, Bias:1/5, VLCD:3.2V, VDD:3.3V
2). Viewing Direction: 12 O'clock
3). Display mode:FSTN/Positive/Transflective
4). Operating temp.: −20°C~+70°C
Storage temp.: −30°C~+80°C
5). IC: NT7605H−BDT01 (or compatible)
6). Backlight: Edge White(2pcs VF=3.1±0.2V IF=30mA)
7). Dimensions with mark "*" are important,with mark "()" are referenced
8). All the raw materials are RoHS compliant

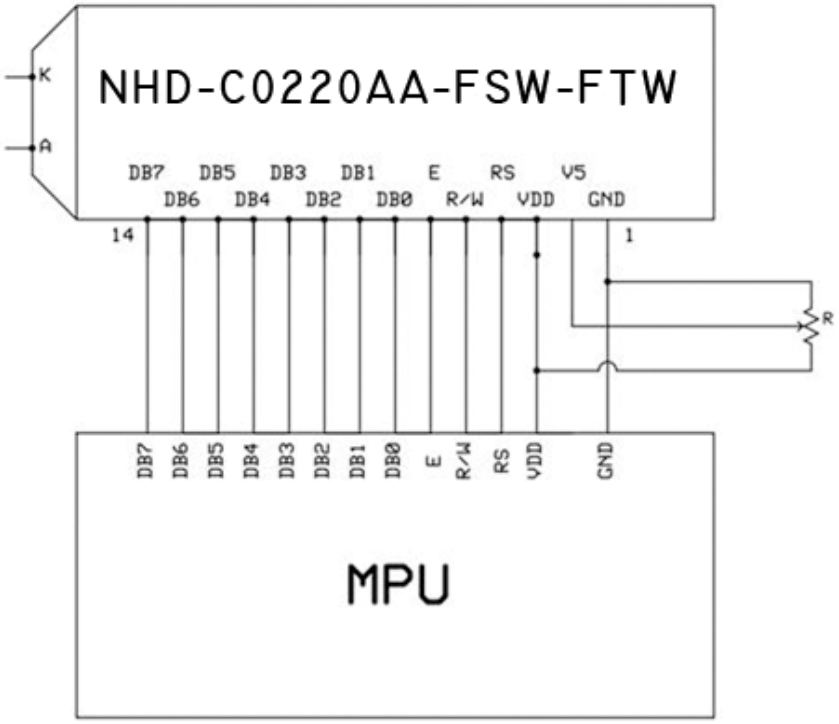
D

Newhaven Display		SCALE: FIT	
		SHEET: 1 OF 1	
		GENERAL TOL: ±0.2	UNIT mm
PART NO: C/D	PROJECTION	MODULE NUMBER	APPROVALS / DATE
NHD-C0220AA-FSW-FTW			APP:
		DO NOT SCALE THIS DRAWING.	CHK:
			DWN:

Pin Description and Wiring Diagram

Pin No.	Symbol	External Connection	Function Description
1	GND	Power Supply	Ground
2	V5	Adj Power Supply	Contrast voltage adjustment (~0.1V)
3	VDD	Power Supply	VDD=3.3V
4	RS	MPU	Register Select: 0=Instruction, 1=Data
5	R/W	MPU	Read / Write select: 0=Write, 1=Read
6	E	MPU	Read/Write start signal (Schmitt trigger input)
7-10	DB0 – DB3	MPU	Low 4 tri-state bi-directional data bus lines. Not used in 4-bit mode.
11-14	DB4 – DB7	MPU	High 4 tri-state bi-directional data bus lines.

Recommended LCD connector: 2.0mm pitch, 14pins Soldered to PCB, or JST p/n: PHR-14
Backlight connector: A and K pins **Mates with**: Solder to wires or PCB



Electrical Characteristics

Item	Symbol	Condition	Min.	Typ.	Max.	Unit
Operating Temperature Range	Top	Absolute Max	-20	25	+70	°C
Storage Temperature Range	Tst	Absolute Max	-30	25	+80	°C
Supply Voltage	VDD		3.2	3.3	3.4	V
Supply Current	IDD	VDD=3.3V			1.0	mA
Supply for LCD (contrast)	Vlcd	**VLCD=VDD-V5**	3.1	3.2	3.3	V
"H" Level input	Vih		0.8VDD		VDD	V
"L" Level input	Vil		0		0.2VDD	V
"H" Level output	Voh		VDD-0.6			V
"L" Level output	Vol				GND+0.6	V
Backlight Supply Voltage	VLED		3.0	3.1	3.2	V
Backlight Supply Current	Iled	VLED=3.1V	30	40	60	mA

Optical Characteristics

Item	Symbol	Condition	Min.	Typ.	Max.	Unit
Viewing Angle - Vertical	AV	Cr ≥ 2	-20		+60	º
Viewing Angle - Horizontal	AH	Cr ≥ 2	-50		+50	º
Contrast Ratio	Cr	25°C	9	15		
Response Time (rise)	Tr			150	200	ms
Response Time (fall)	Tr			250	400	ms

Controller Information

Built-in NT7605N-BDT01. Download specification at http://www.newhavendisplay.com/app_notes/NT7605.pdf

NOTE: The Busy Flag of the NT7605 controller may not always be responsive. Add sufficient delays and/or a time-out check routine to continue operation if busy flag is not cleared.

Table of Commands

Instruction	Code										Function	Execution time (max) (fosc = 250KHz)
	RS	RW	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0		
Display Clear	0	0	0	0	0	0	0	0	0	1	Clear entire display area, Restore display from shift, and load address counter with DD RAM address 00H.	1.64ms
Display/ Cursor Home	0	0	0	0	0	0	0	0	1	*	Restore display from shift and load address counter with DD RAM address 00H.	1.64ms
Entry Mode Set	0	0	0	0	0	0	0	1	I/D	S	Specify direction of cursor movement and display shift mode. This operation takes place after each data transfer (read/write).	40µs
Display ON/OFF	0	0	0	0	0	0	1	D	C	B	Specify activation of display (D) cursor (C) and blinking of character at cursor position (B).	40µs
Display/ Cursor Shift	0	0	0	0	0	1	S/C	R/L	*	*	Shift display or move cursor.	40µs
Function Set	0	0	0	0	1	DL	N	F	*	*	Set interface data length (DL), number of display line (N), and character font (F).	40µs
RAM Address Set	0	0	0	1	ACG						Load the address counter with a CG RAM address. Subsequent data access is for CG RAM data.	40µs
DD RAM Address Set	0	0	1	ADD							Load the address counter with a DD RAM address. Subsequent data access is for DD RAM data.	40µs
Busy Flag/ Address Counter Read	0	1	BF	AC							Read Busy Flag (BF) and contents of Address Counter (AC).	1µs
CG RAM/ DD RAM Data Write	1	0	Write data								Write data to CG RAM or DD RAM.	40µs
CG RAM/ DD RAM Data Read	1	1	Read data								Read data from CG RAM or DD RAM.	40µs
	I/D = 1 : Increment S = 1 : Display Shift On D = 1 : Display On C = 1 : Cursor Display On B = 1 : Cursor Blink On S/C = 1 : Shift Display R/L = 1 : Shift Right DL = 1 : 8-Bit N = 1 : Dual Line F = 1 : 5x10 dots BF = 1 : Internal Operation BF = 0 : Ready for Instruction						I/D = 0 : Decrement S/C = 0 : Move Cursor R/L = 0 : Shift Left DL = 0 : 4-Bit N = 0 : Signal Line F = 0 : 5x8 dots				DD RAM : Display Data RAM CG RAM : Character Generator RAM ACG : Character Generator RAM Address ADD : Display Data RAM Address AC : Address Counter	

Note 1: Symbol "*" signifies an insignificant bit (disregard).
Note 2: Correct input value for "N" is predetermined for each model.

Display Character Address Code

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
00	01	02	03	04	05	06	07	08	09	0A	0B	0C	0D	0E	0F	10	11	12	13
40	41	42	43	44	45	46	47	48	49	4A	4B	4C	4D	4E	4F	50	51	52	53

Timing Characteristics

Read Operation

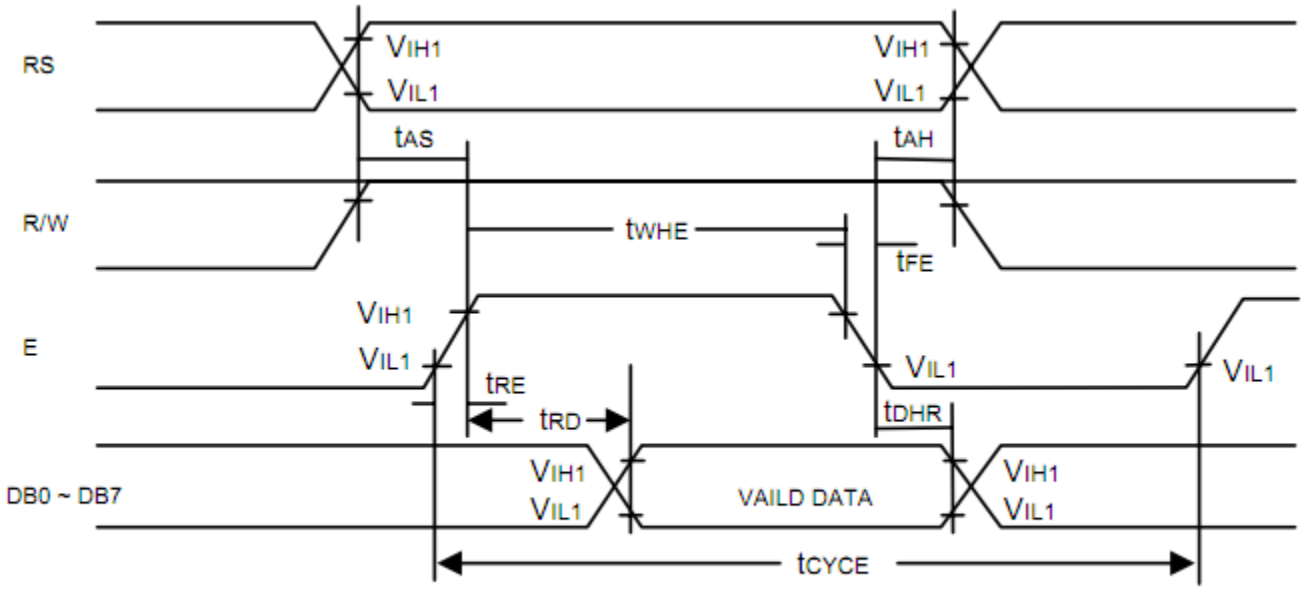


Figure 1. Bus Read Operation Sequence
(Reading out data from NT7605 to MPU)

Read Cycle (V_{DD} = 5.0V, GND = 0V, T_A = 25°C)

Symbol	Parameter	Min.	Typ.	Max.	Unit	Conditions
t_{CYCE}	Enable Cycle Time	500	-	-	ns	Figure 1
t_{WHE}	Enable "H" Level Pulse Width	300	-	-	ns	Figure 1
t_{RE}, t_{FE}	Enable Rise/Fall Time	-	-	25	ns	Figure 1
t_{AS}	RS, R/W Setup Time	60[1]	-	-	ns	Figure 1
		100[2]				
t_{AH}	RS, R/W Address Hold Time	10	-	-	ns	Figure 1
t_{RD}	Read Data Output Delay	-	-	190	ns	Figure 1
t_{DHR}	Read Data Hold Time	20	-	-	ns	Figure 1

Notes: 1: 8-bit operation mode
2: 4-bit operation mode

Write Operation

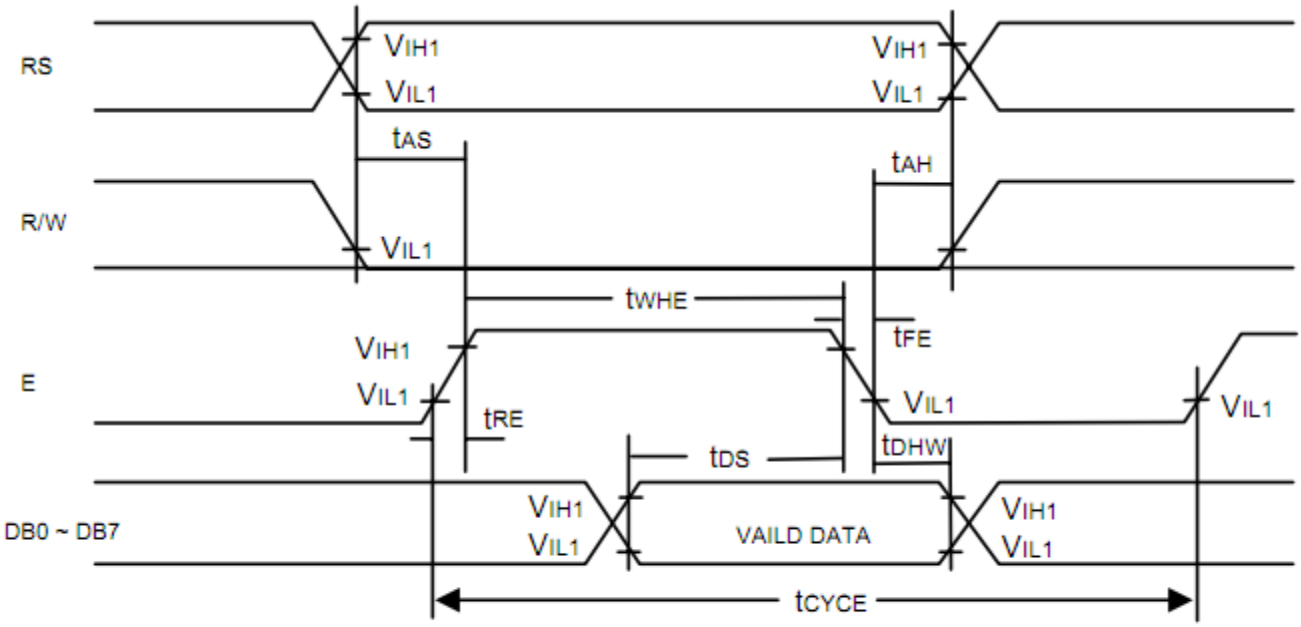


Figure 2. Bus Write Operation Sequence
(Writing data from MPU to NT7605)

Write Cycle (V_{DD} = 5.0V, GND = 0V, T_A = 25°C)

Symbol	Parameter	Min.	Typ.	Max.	Unit	Conditions
t_{CYCE}	Enable Cycle Time	500	-	-	ns	Figure 2
t_{WHE}	Enable "H" Level Pulse Width	300	-	-	ns	Figure 2
t_{RE}, t_{FE}	Enable Rise/Fall Time	-	-	25	ns	Figure 2
t_{AS}	RS, R/W Setup Time	60[1]	-	-	ns	Figure 2
		100[2]				
t_{AH}	RS, R/W Address Hold Time	10	-	-	ns	Figure 2
t_{DS}	Data Output Delay	100	-	-	ns	Figure 2
t_{DHW}	Data Hold Time	10	-	-	ns	Figure 2

Notes: 1: 8-bit operation mode
2: 4-bit operation mode

Built-in Font Table

Example Initialization Program

```
'INIT-------------------------------------------------------------------------
A = &H30
Call Writecom                                                          'wake up
Waitms 100
Call Writecom                                                          'wake up
Waitms 10
Call Writecom                                                          'wake up
Waitms 10
A = &H38
'function set
Call Writecom
A = &H10
'shift display=no
Call Writecom
A = &H0C
'display on
Call Writecom
A = &H06
'entry mode set
Call Writecom
'-----------------------------------------------------------------------------
Sub Writecom
P1 = A
Reset P3.0
'instruction
Reset P3.7
'RW
Waitms 1
Set P3.4
'E
Waitms 1
Reset P3.4                                                               'E
End Sub
'-----------------------------------------------------------------------------
Sub Writedata
P1 = A
Set P3.0
'data
Reset P3.7
'RW
Waitms 1
Set P3.4
'E
Waitms 1
Reset P3.4                                                               'E
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 , 96hrs	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

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- Подбор аналогов;
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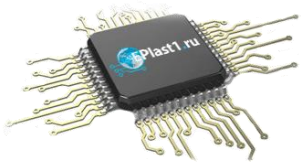
- Техническая поддержка проекта;
- Защита от снятия компонента с производства.



Как с нами связаться

Телефон: 8 (812) 309 58 32 (многоканальный)
Факс: 8 (812) 320-02-42
Электронная почта: org@eplast1.ru
Адрес: 198099, г. Санкт-Петербург, ул. Калинина, дом 2, корпус 4, литера А.