NHD-24064CZ-FSW-GBW

Graphic Liquid Crystal Display Module

NHD-	Newhaven Display
24064-	240 x 64 Pixels
CZ-	Model
F-	Transflective
SW-	Side White LED Backlight
G-	STN Gray, Positive
B-	6:00 Optimal View
W-	Wide Temperature
	RoHS Compliant

Newhaven Display International, Inc.

2661 Galvin Ct.

Elgin IL, 60124

Ph: 847-844-8795 Fax: 847-844-8796

www.newhavendisplay.com

nhtech@newhavendisplay.com nhsales@newhavendisplay.com

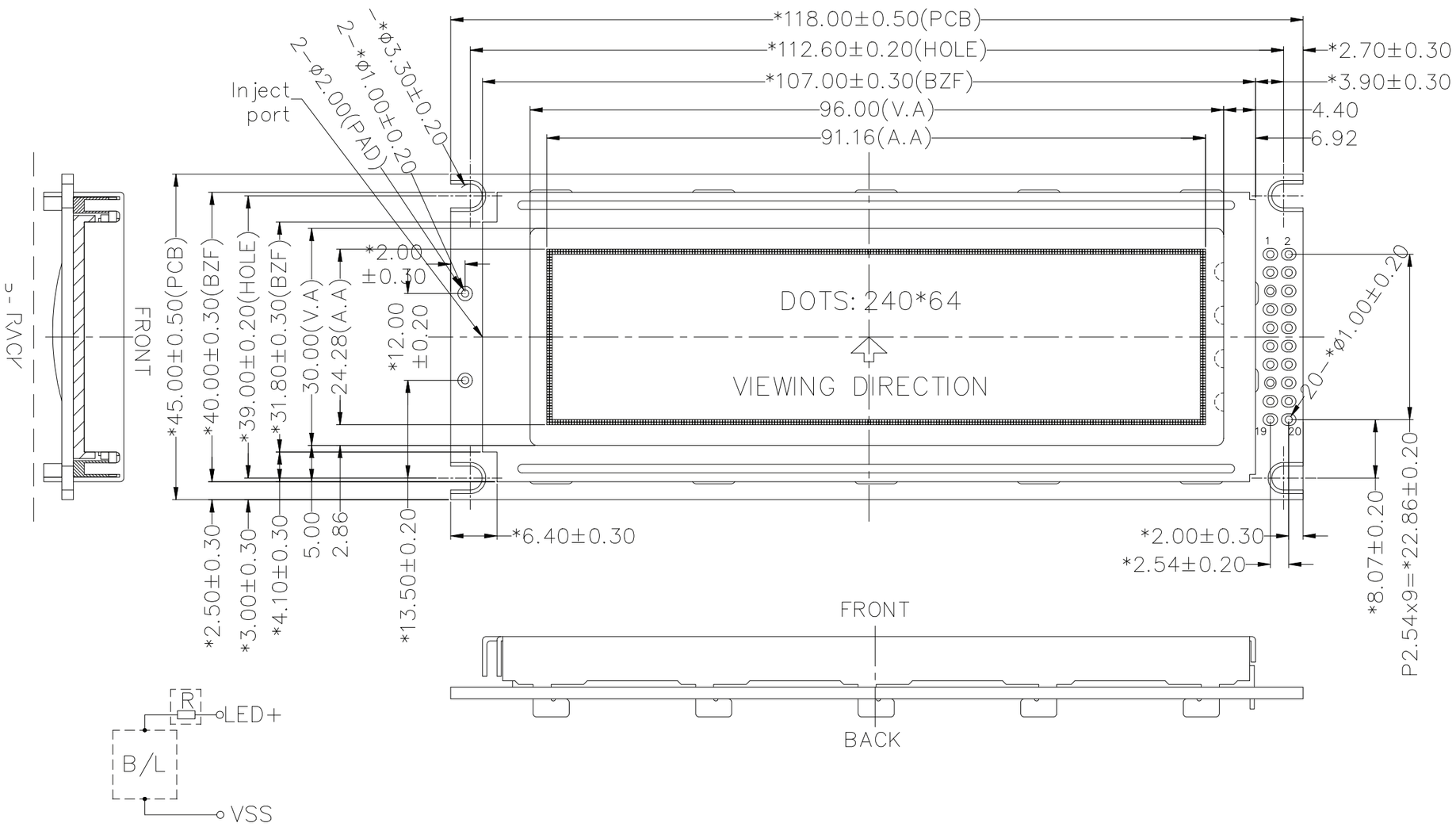
Document Revision History

Revision	Date	Description	Changed by
0	2/29/08	Initial Release	-
1	7/20/09	User guide reformat	BE
2	12/4/09	Pin Description Revised	BE
3	4/15/10	Updates	BE
4	5/5/10	Electrical updated	BE
5	4/12/13	Drawing page and Electrical & Optical Characteristics updated.	JN
6	5/3/13	Added font table	JN
7	7/17/13	Mechanical drawing updated.	JN
8	9/7/15	Module redesigned	AK
9	5/9/18	Backlight Characteristics Updated	SB

Functions and Features

- **240 x 64 pixels**
- **Built-in RA6963 controller**
- **+5.0V Power Supply**
- **1/64 duty, 1/9 bias**
- **RoHS Compliant**

SYMBOL	REVISION	DATE



CONSTANT VOLTAGE: 5.0V,60mA(MAX)
BACKLIGHT DRIVER CIRCUIT DIAGRAM

PIN	1	2	3	4	5	6	7	8	9	10
CONNECTION	FGND	VSS	VDD	V0	/WR	/RD	/CE	C/D	VEE	RES
PIN	11	12	13	14	15	16	17	18	19	20
CONNECTION	DB0	DB1	DB2	DB3	DB4	DB5	DB6	DB7	FS	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, 13.5V VLCD
5. Backlight: White LED
6. Driver IC: RA6963

Label

NEWHAVEN DISPLAY
NHD-24064CZ-FSW-GBW_Rev1A
WWYY

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-24064CZ-FSW-GBW
REVISION: 1A
SIZE: A3
SCALE: NS

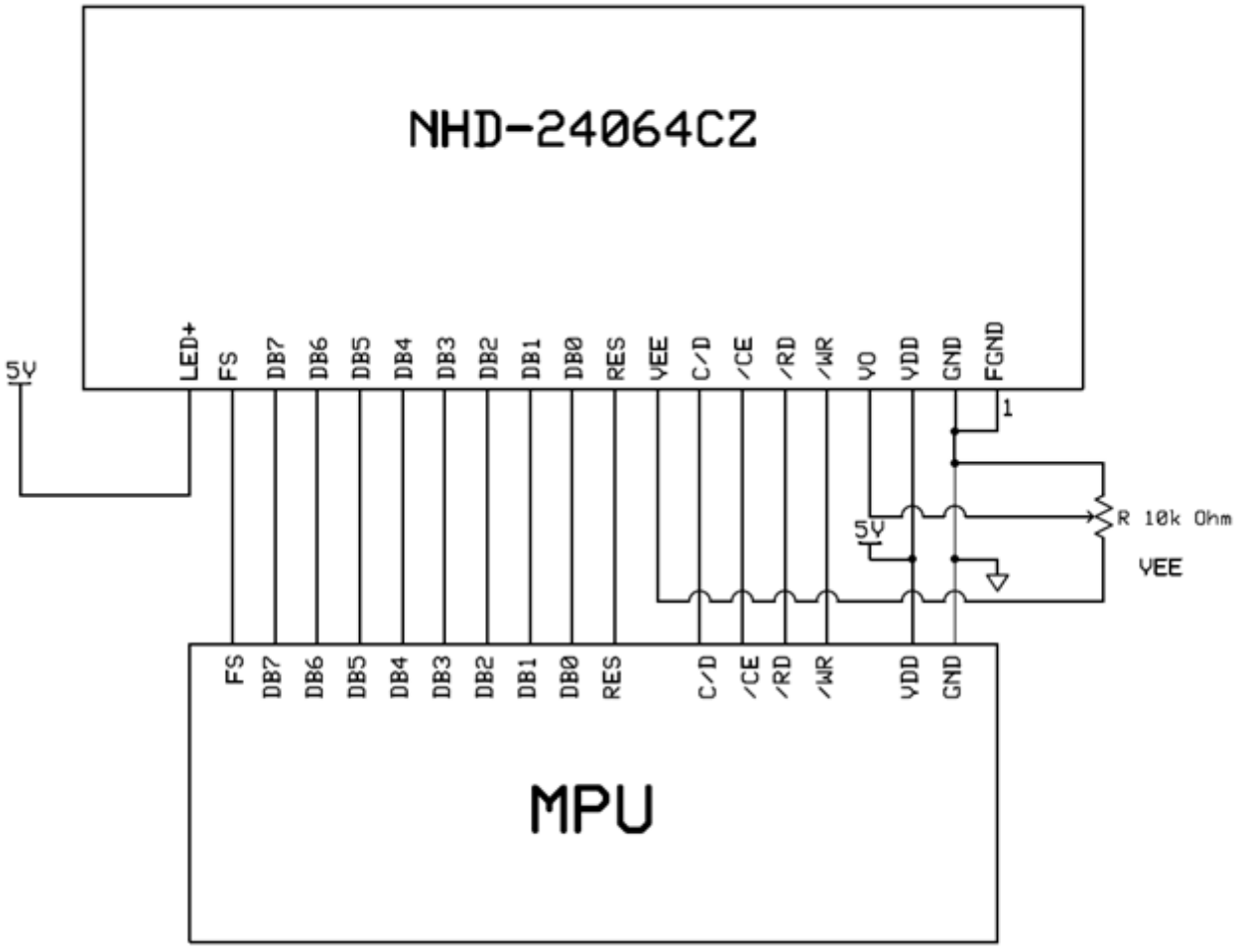
DRAWN BY:	CHECKED BY:	APPROVED BY:
S. Baxi	S. Baxi	T. Tung
DRAWN DATE:	CHECKED DATE:	APPROVED DATE:
05/09/18	05/09/18	05/09/18

DO NOT SCALE DRAWING | SHEET 1 OF 1

Pin Description and Wiring Diagram

Pin No.	Symbol	External Connection	Function Description
1	FGND	Power Supply	Frame Ground
2	VSS	Power Supply	Ground for LCD and Backlight
3	VDD	Power Supply	Power supply for logic (+5.0V)
4	V0	Adj. Power Supply	Power Supply for contrast (approx. -8.5V)
5	/WR	MPU	Active LOW Write signal
6	/RD	MPU	Active LOW Read signal
7	/CE	MPU	Active LOW Chip Enable
8	C/D	MPU	Register select signal C/D=0: DATA, C/D=1: COMMAND
9	VEE	Power Supply	Negative voltage output (-10V)
10	RES	MPU	Active LOW reset signal
11~18	DBO~DB7	MPU	Bi-directional 8-bit data bus
19	FS	MPU	Font Select: 1=6x8 fonts, 0=8x8 fonts
20	LED+	Power Supply	Power supply for LED Backlight (+5.0V via on-board resistor)

Recommended LCD connector: 2.54mm pitch pins
Backlight connector: Anode at Pin 20 of LCD 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}	-	4.75	5.0	5.25	V
Supply Current	I_{DD}	V_{DD} = 5.0V	6	12	25	mA
Supply for LCD (contrast)	V_{LCD}	T_{OP} = 25°C	13.2	13.5	13.8	V
"H" Level input	V_{IH}	-	0.8 * V_{DD}	-	V_{DD}	V
"L" Level input	V_{IL}	-	0	-	0.15 * V_{DD}	V
"H" Level output	V_{OH}	-	V_{DD} - 0.3	-	V_{DD}	V
"L" Level output	V_{OL}	-	V_{SS}	-	0.3	V
Backlight Supply Voltage	V_{LED}	-	4.8	5.0	5.2	V
Backlight Supply Current	I_{LED}	V_{LED} = 5.0 V	15	32	60	mA

Optical Characteristics

Item		Symbol	Condition	Min.	Typ.	Max.	Unit
Optimal Viewing Angles	Top	φY+	CR ≥ 2	-	40	-	°
	Bottom	φY-		-	40	-	°
	Left	θX-		-	35	-	°
	Right	θX+		-	35	-	°
Contrast Ratio		CR	-	2	5	-	-
Response Time	Rise	T_R	T_{OP} = 25°C	-	150	250	ms
	Fall	T_F		-	110	210	ms

Controller Information

Built-in RA6963 controller.
Please download specification at http://www.newhavendisplay.com/app_notes/RA6963.pdf

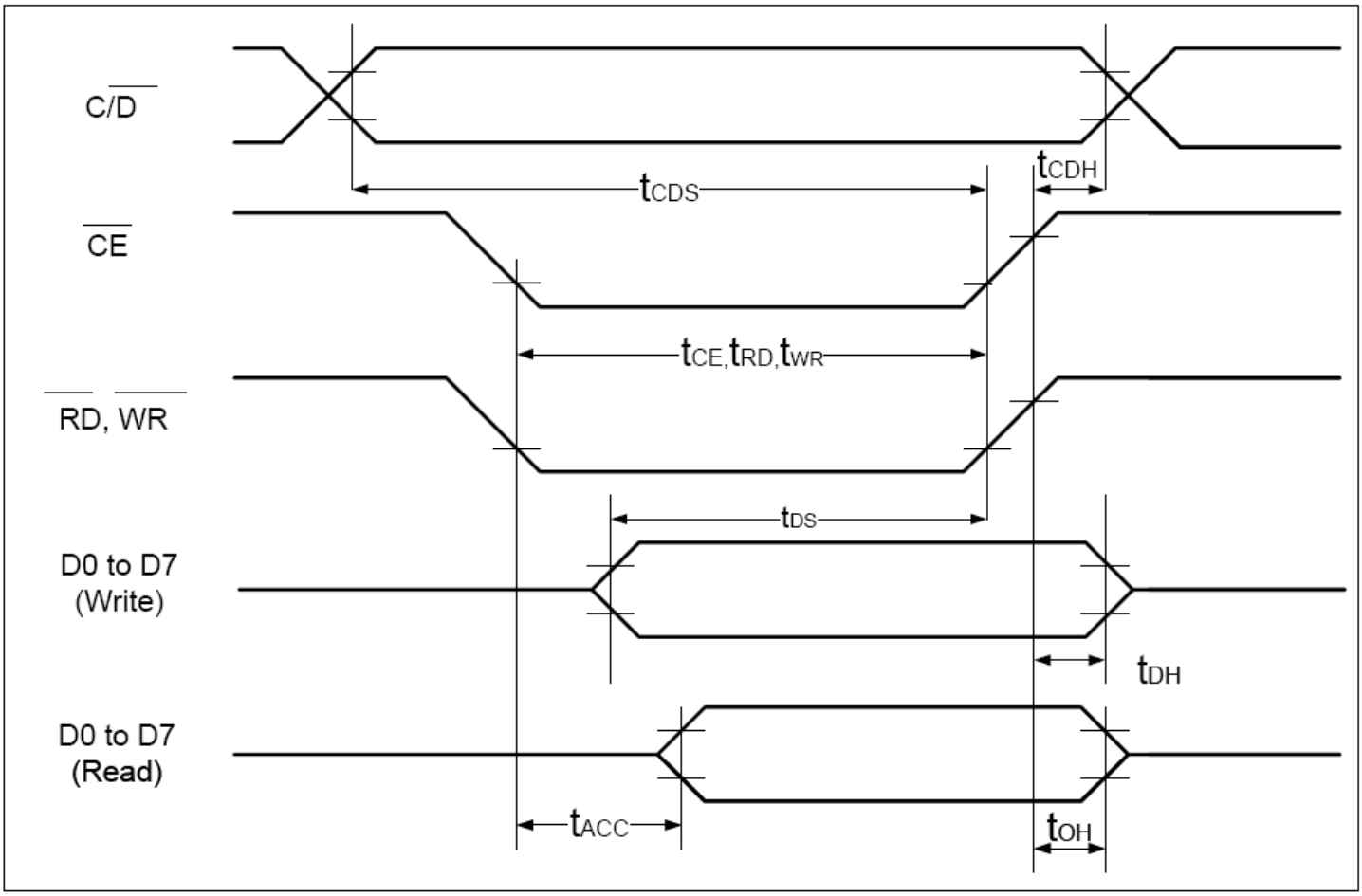
Table of Commands

Command	Code	D1	D2	Function
Registers Setting	00100001	X address	Y address	Set cursor pointer
	00100010	Data	00h	Set Offset Register
	00100100	Low address	High address	Set Address pointer
Set Control Word	01000000	Low address	High address	Set Text Home Address
	01000001	Columns	00h	Set Text Area
	01000010	Low address	High address	Set Graphic Home Address
	01000011	Columns	00h	Set Graphic Area
Mode Set	1000X000	--	--	OR mode
	1000X001	--	--	EXOR mode
	1000X011	--	--	AND mode
	1000X100	--	--	Text Attribute mode
	10000XXX	--	--	Internal CG ROM mode
	10001XXX	--	--	External CG RAM mode
Display Mode	10010000	--	--	Display off
	1001XX10	--	--	Cursor on, blink off
	1001XX11	--	--	Cursor on, blink on
	100101XX	--	--	Text on, graphic off
	100110XX	--	--	Text off, graphic on
	100111XX	--	--	Text on, graphic on
Cursor Pattern Select	10100000	--	--	1-line cursor
	10100001	--	--	2-line cursor
	10100010	--	--	3-line cursor
	10100011	--	--	4-line cursor
	10100100	--	--	5-line cursor
	10100101	--	--	6-line cursor
	10100110	--	--	7-line cursor
	10100111	--	--	8-line cursor
Data Read/Write	11000000	Data	--	Data Write and Increment ADP
	11000001	--	--	Data Read and Increment ADP
	11000010	Data	--	Data Write and Decrement ADP
	11000011	--	--	Data Read and Decrement ADP
	11000100	Data	--	Data Write and Non-variable ADP
	11000101	--	--	Data Read and Non-variable ADP
Data auto Read/Write	10110000	--	--	Set Data Auto Write
	10110001	--	--	Set Data Auto Read
	10110010	--	--	Auto Reset
Screen Peek	11100000	–	--	Screen Peek
Screen Copy	11101000			Screen Copy
Bit Set/Reset	11110XXX	--	--	Bit Reset
	11111XXX	--	--	Bit Set
	1111X000	--	--	Bit 0 (LSB)
	1111X001	--	--	Bit 1
	1111X010	--	--	Bit 2
	1111X011	--	--	Bit 3
	1111X100	--	--	Bit 4
	1111X101	--	--	Bit 5
	1111X110	--	--	Bit 6
	1111X111	--	--	Bit 7 (MSB)
Screen Reverse	11010000	Data	--	Whole screen reverse

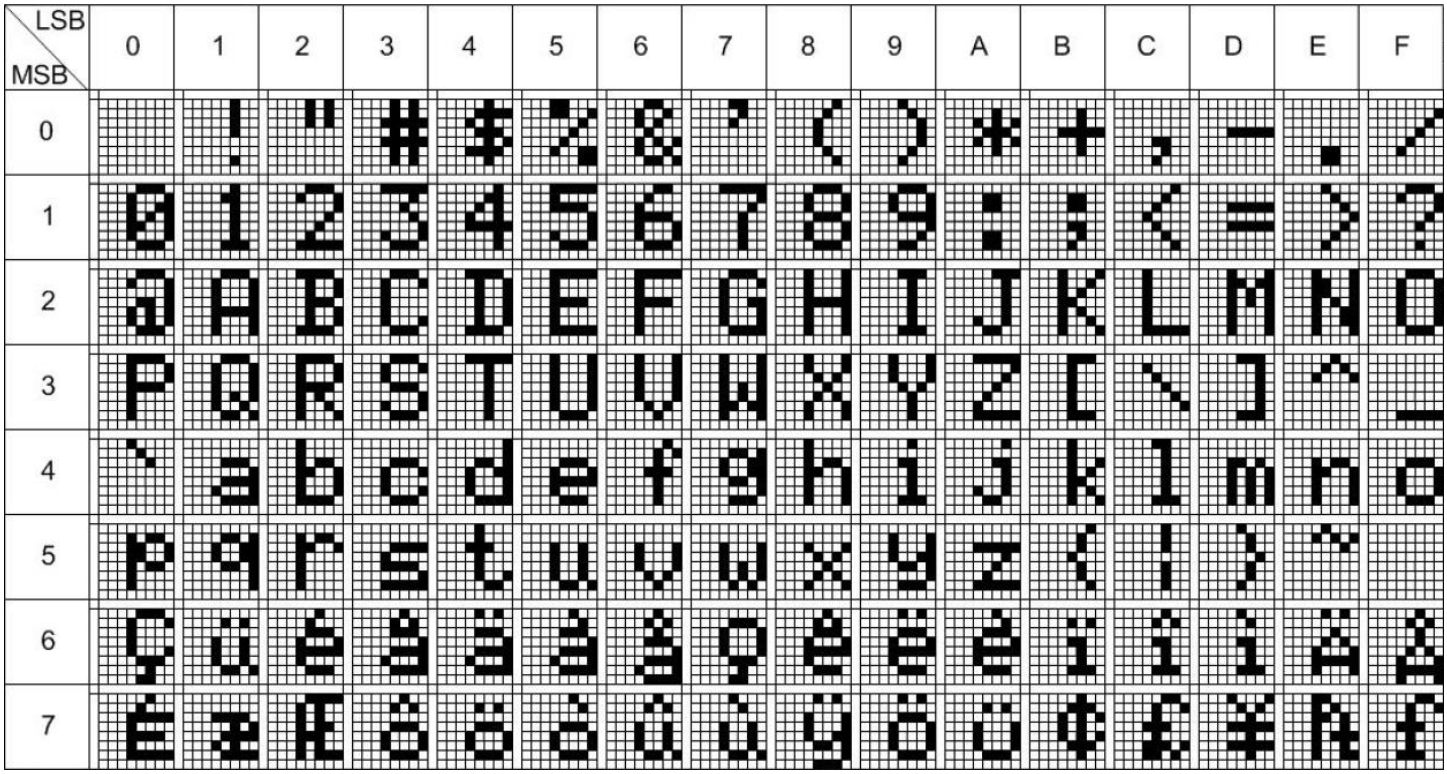
Timing Characteristics

(V_{DD}=+5V±5%,GND=0V,Ta= -20 to +70℃)

Item	Symbol	Test Conditions	Min.	Max.	Unit
C/$\overline{D}$ Set Up Time	t_{CDS}	--	100	--	ns
C/$\overline{D}$ Hold Time	t_{CDH}	--	10	--	ns
$\overline{CE}$, $\overline{RD}$, $\overline{WR}$ Pulse Width	t_{CE}, t_{RD}, t_{WR}	--	80	--	ns
Data Set Up Time	t_{DS}	--	80	--	ns
Data Hold Time	t_{DH}	--	40	--	ns
Access Time	t_{ACC}	--	--	150	ns
Output Hold Time	t_{OH}	--	10	50	ns



Built-in Font Table



Example Initialization Program

```
void command(int A)
{
        P1 = A;
        ID = 1;                 //Command
        CE = 0;
        WRT = 0;
        WRT = 1;
        CE = 1;
}

void data(int A)
{
        P1 = A;
        ID = 0;                 //Data
        CE = 0;
        WRT = 0;
        WRT = 1;
        CE = 1;
}

void init()
{
        RST = 1;
        RDD = 1;
        F_S = 1;
        data(0x00);
        data(0x00);
        commnd(0x40);           //Set Text Home Address
        data(0x00);             //Low Address Columns
        data(0x40);             //High Address
        command(0x42);                  //Set Graphic Home Address
        data(0x1E);             //Low Address Columns
        data(0x00);             //High Address
        command(0x41);                  //Set Text Area
        data(0x1E);             //Low Address Columns
        data(0x00);             //High Address
        command(0x43);                  //Set Graphic Areaa
        command(0x80);                  //Mode Set to 'OR' mode
}
```

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, 200 Hrs.	2
Low Temperature storage	Endurance test applying the low storage temperature for a long time.	-30°C, 200 Hrs.	1,2
High Temperature Operation	Endurance test applying the electric stress (voltage & current) and the high thermal stress for a long time.	+70°C, 200 Hrs.	2
Low Temperature Operation	Endurance test applying the electric stress (voltage & current) and the low thermal stress for a long time.	-20°C, 200 Hrs.	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.	+60°C, 90% RH, 96 Hrs.	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, 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