NHD-0108CZ-FSW-GBW-33V3

Character Liquid Crystal Display Module

NHD-	Newhaven Display
0108-	1 line x 8 characters
CZ-	Model
F-	Transflective
SW-	Side White LED Backlight
G-	STN- Gray
B-	6:00 view
W-	Wide Temperature (-20°C~+70°C)
33V3-	3.3VDD, 3V Backlight
	RoHS Compliant

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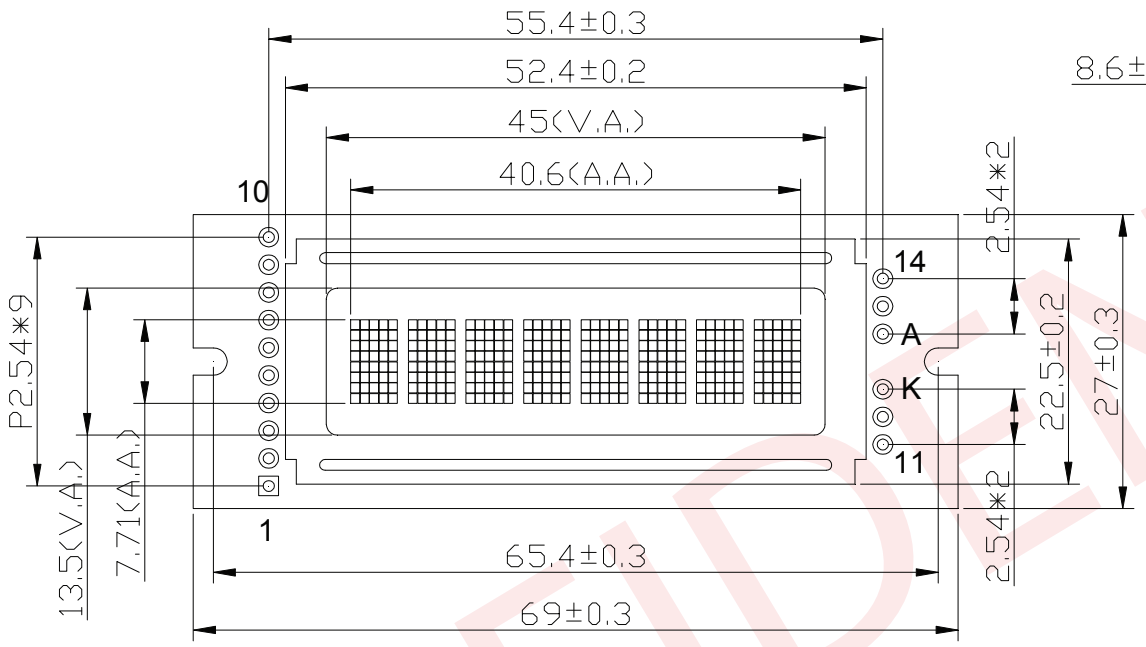
Document Revision History

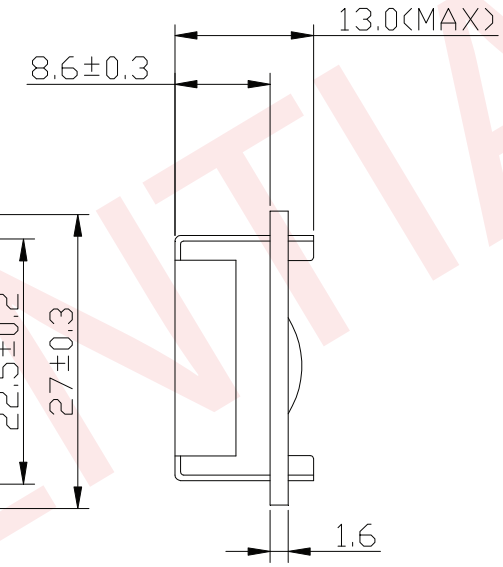
Revision	Date	Description	Changed by
0	10/31/2011	33V – Improved LCD Liquid; VDD = 3.3V	SB
1	07/18/2013	Mechanical and Timing characteristics updated	KA

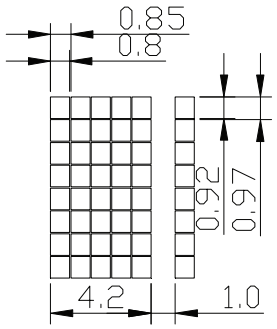
Functions and Features

- **1 line x 8 characters**
- **Built-in controller (ST7066U or equivalent)**
- **+3.3V power supply**
- **4-bit or 8-bit MPU interface**
- **RoHS compliant**

Mechanical Drawing







PIN ASSIGNMENT

1	VSS
2	VDD
3	V0
4	RS
5	R/W
6	E
7~10	DB4~DB7
11~14	DB0~DB3
A	LED+
K	LED-

Notes:

1). Driver Method: 1/8duty, 1/4bias, VDD3.3V VLCD3.3V
2). Display Type: STN-Gray/Positive/Transflective/6:00 Visual Angle
3). Operating Temp: -20°C~70°C/Storage Temp: -30°C~80°C
4). Backlight Type: Edge/White/Vled3.0V/30mA
5). Driver: ST7066U/4bit or 8bit MPU
6). RoHS Compliant

Rev	Description	Date

	Date	
	07/18/13	NEWHAVEN DISPLAY INTERNATIONAL
Gen. Tolerance ±0.3mm	Unit mm	Model: NHD-0108CZ-FSW-GBW-33V3

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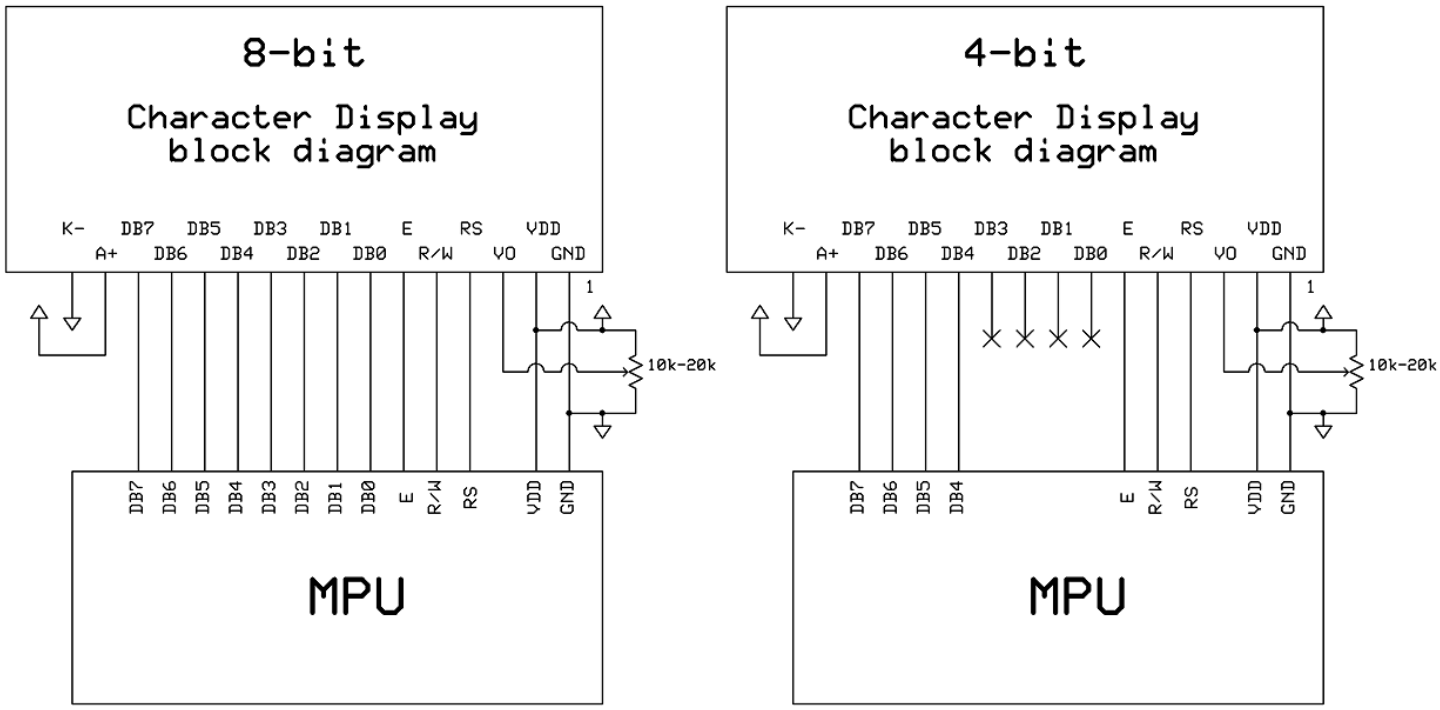
Pin Description and Wiring Diagram

Pin No.	Symbol	External Connection	Function Description
1	VSS	Power Supply	Ground
2	VDD	Power Supply	Supply Voltage for logic (+3.3V)
3	V0	Adj Power Supply	Power supply for contrast (approx. 0V)
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	DB4 – DB7	MPU	Four high order bi-directional three-state data bus lines.
11-14	DB0 – DB3	MPU	Four low order bi-directional three-state data bus lines. These four are not used during 4-bit operation.
A	LED+	Power Supply	Power supply for LED Backlight (+3.0V)
K	LED-	Power Supply	Ground for Backlight

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



Electrical Characteristics

Item	Symbol	Condition	Min.	Typ.	Max.	Unit
Operating Temperature Range	Top	Absolute Max	-20	-	+70	ºC
Storage Temperature Range	Tst	Absolute Max	-30	-	+80	ºC
Supply Voltage	VDD		-	3.3	-	V
Supply Current	IDD	Ta=25°C, VDD=3.3V	-	1.5	2.5	mA
Supply for LCD (contrast)	VDD-V0	Ta=25°C	-	3.3	-	V
"H" Level input	Vih		0.7*VDD	-	VDD	V
"L" Level input	Vil		0	-	0.6	V
"H" Level output	Voh		0.75*VDD	-	-	V
"L" Level output	Vol		-	-	0.2*VDD	V
Backlight Supply Voltage	Vled	-	2.8	3.0	3.3	V
Backlight Supply Current	Iled	Vled=3.0V	-	30	40	mA

Optical Characteristics

Item	Symbol	Condition	Min.	Typ.	Max.	Unit
Viewing Angle – Top		Cr ≥ 2	-	40	-	º
Viewing Angle – Bottom			-	60	-	º
Viewing Angle – Left			-	60	-	º
Viewing Angle - Right			-	60	-	º
Contrast Ratio	Cr		2	5	-	-
Response Time (rise)	Tr	-	-	150	250	ms
Response Time (fall)	Tf	-	-	200	300	ms

Controller Information

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

DDRAM Address

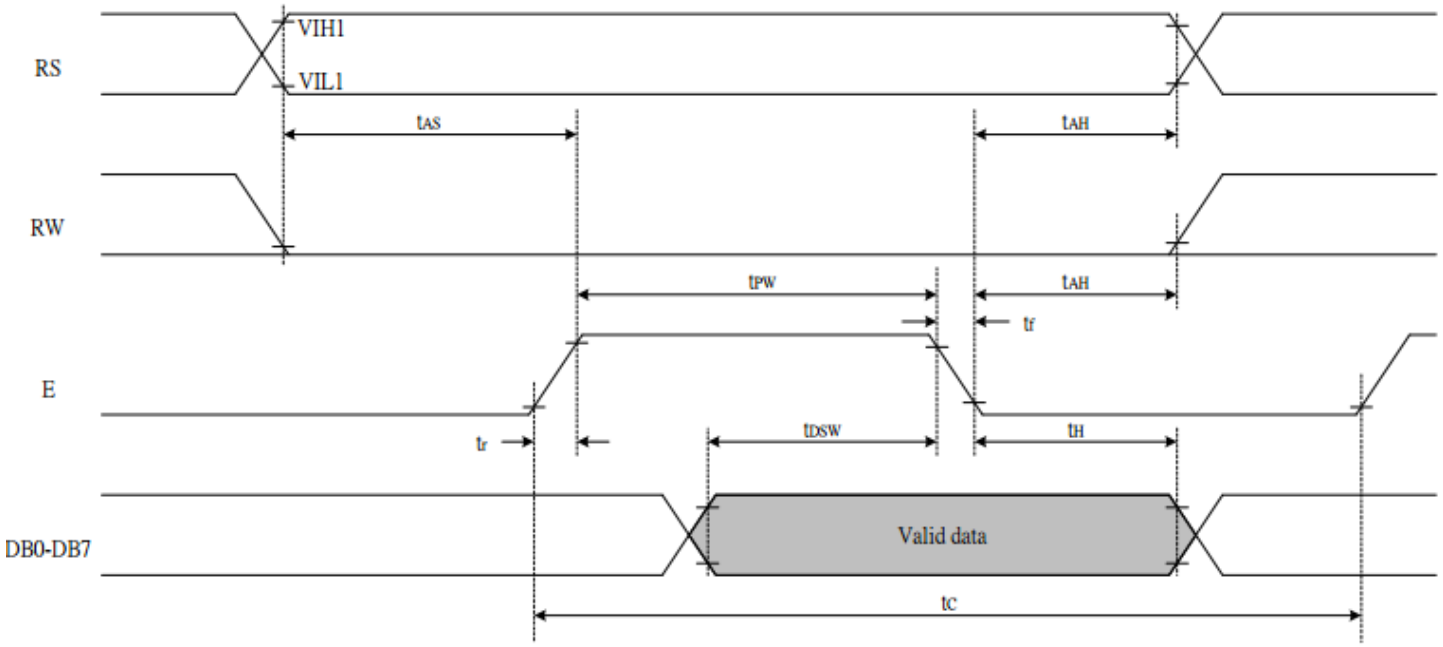
1	2	3	4	5	6	7	8
00	01	02	03	04	05	06	07

Table of Commands

Instruction	Instruction Code										Description	Description Time (270KHz)
	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	1.52 ms
Return Home	0	0	0	0	0	0	0	0	1	x	Set DDRAM address to "00H" from AC and return cursor to its original position if shifted. The contents of DDRAM are not changed.	1.52 ms
Entry Mode Set	0	0	0	0	0	0	0	1	I/D	S	Sets cursor move direction and specifies display shift. These operations are performed during data write and read.	37 us
Display ON/OFF	0	0	0	0	0	0	1	D	C	B	D=1:entire display on C=1:cursor on B=1:cursor position on	37 us
Cursor or Display Shift	0	0	0	0	0	1	S/C	R/L	x	x	Set cursor moving and display shift control bit, and the direction, without changing DDRAM data.	37 us
Function Set	0	0	0	0	1	DL	N	F	x	x	DL:interface data is 8/4 bits N:number of line is 2/1 F:font size is 5x11/5x8	37 us
Set CGRAM address	0	0	0	1	AC5	AC4	AC3	AC2	AC1	AC0	Set CGRAM address in address counter	37 us
Set DDRAM address	0	0	1	AC6	AC5	AC4	AC3	AC2	AC1	AC0	Set DDRAM address in address counter	37 us
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.	0 us
Write data to RAM	1	0	D7	D6	D5	D4	D3	D2	D1	D0	Write data into internal RAM (DDRAM/CGRAM)	37 us
Read data from RAM	1	1	D7	D6	D5	D4	D3	D2	D1	D0	Read data from internal RAM (DDRAM/CGRAM)	37 us

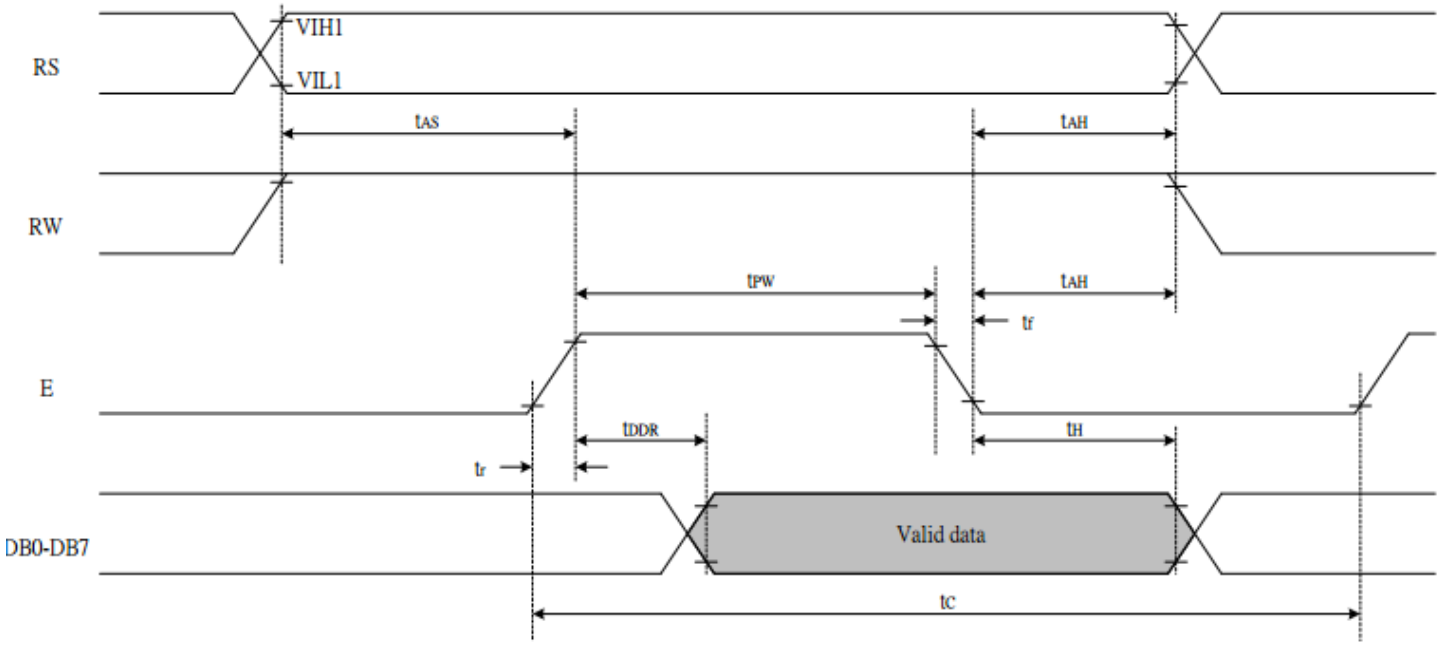
Timing Characteristics

Writing data from MPU to ST7066U



Write Mode (Writing data from MPU to ST7066U)						
T_C	Enable Cycle Time	Pin E	1200	-	-	ns
T_{PW}	Enable Pulse Width	Pin E	140	-	-	ns
T_R, T_F	Enable Rise/Fall Time	Pin E	-	-	25	ns
T_{AS}	Address Setup Time	Pins: RS,RW,E	0	-	-	ns
T_{AH}	Address Hold Time	Pins: RS,RW,E	10	-	-	ns
T_{DSW}	Data Setup Time	Pins: DB0 - DB7	40	-	-	ns
T_H	Data Hold Time	Pins: DB0 - DB7	10	-	-	ns

Reading data from ST7066U to MPU



Read Mode (Reading Data from ST7066U to MPU)						
T_C	Enable Cycle Time	Pin E	1200	-	-	ns
T_{PW}	Enable Pulse Width	Pin E	140	-	-	ns
T_R,T_F	Enable Rise/Fall Time	Pin E	-	-	25	ns
T_{AS}	Address Setup Time	Pins: RS,RW,E	0	-	-	ns
T_{AH}	Address Hold Time	Pins: RS,RW,E	10	-	-	ns
T_{DDR}	Data Setup Time	Pins: DB0 - DB7	-	-	100	ns
T_H	Data Hold Time	Pins: DB0 - DB7	10	-	-	ns

Built-in Font Table

Example Initialization Code

8-bit Initialization:

```
/*********************************************************/
void command(char i)
{
      P1 = i;                         //put data on output Port
      D_I =0;                         //D/I=LOW : send instruction
      R_W =0;                         //R/W=LOW : Write
      E  = 1;
      Delay(1);                       //enable pulse width  >= 460ns
        E  = 0;                       //Clock enable: falling edge
}
/*********************************************************/
void write(char i)
{
      P1 = i;                         //put data on output Port
      D_I =1;                         //D/I=HIGH : send data
      R_W =0;                         //R/W=LOW : Write
      E  = 1;
      Delay(1);                       //enable pulse width  >= 460ns
      E  = 0;                         //Clock enable: falling edge
}
/*********************************************************/
void init()
{
      E = 0;
      Delay(100);                     //Wait >40 msec after power is applied
      command(0x30);                  //command 0x30 = Wake up
      Delay(30);                      //must wait 5ms, busy flag not available
      command(0x30);                  //command 0x30 = Wake up #2
      Delay(10);                      //must wait 160us, busy flag not available
      command(0x30);                  //command 0x30 = Wake up #3
      Delay(10);                      //must wait 160us, busy flag not available
      command(0x38);                  //Function set: 8-bit/2-line
      command(0x10);                  //Set cursor
      command(0x0c);                  //Display ON; Cursor ON
      command(0x06);                  //Entry mode set
}
/*********************************************************/
```

4-bit Initialization:

```
/*********************************************************/
void command(char i)
{
      P1 = i;                         //put data on output Port
      D_I =0;                         //D/I=LOW : send instruction
      R_W =0;                         //R/W=LOW : Write
      Nybble();                       //Send lower 4 bits
      i = i<<4;                       //Shift over by 4 bits
      P1 = i;                         //put data on output Port
      Nybble();                       //Send upper 4 bits
}
/*********************************************************/
void write(char i)
{
      P1 = i;                         //put data on output Port
      D_I =1;                         //D/I=HIGH : send data
      R_W =0;                         //R/W=LOW : Write
      Nybble();                       //Clock lower 4 bits
      i = i<<4;                       //Shift over by 4 bits
      P1 = i;                         //put data on output Port
      Nybble();                       //Clock upper 4 bits
}
/*********************************************************/
void Nybble()
{
      E = 1;
      Delay(1);                       //enable pulse width  >= 460ns
      E = 0;                          //Clock enable: falling edge
}
/*********************************************************/
void init()
{
      P1 = 0;
      P3 = 0;
      Delay(100);                     //Wait >40 msec after power is applied
      P1 = 0x30;                      //put 0x30 on the output port
      Delay(30);                      //must wait 5ms, busy flag not available
      Nybble();                       //command 0x30 = Wake up
      Delay(10);                      //must wait 160us, busy flag not available
      Nybble();                       //command 0x30 = Wake up #2
      Delay(10);                      //must wait 160us, busy flag not available
      Nybble();                       //command 0x30 = Wake up #3
      Delay(10);                      //can check busy flag now instead of delay
      P1= 0x20;                       //put 0x20 on the output port
      Nybble();                       //Function set: 4-bit interface
      command(0x28);                  //Function set: 4-bit/2-line
      command(0x10);                  //Set cursor
      command(0x0F);                  //Display ON; Blinking cursor
      command(0x06);                  //Entry Mode set
}
/*********************************************************/
```

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

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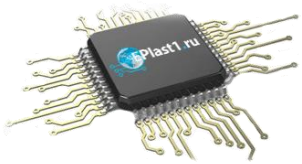
- Подбор аналогов;
- Консультации по применению компонента;
- Поставка образцов и прототипов;
- Техническая поддержка проекта;
- Защита от снятия компонента с производства.



Как с нами связаться

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