

# NHD-C128128CZ-FN-GBW

## COG (Chip-On-Glass) Liquid Crystal Display Module

NHD-	Newhaven Display
C128128-	128 x 128 pixels
CZ-	Model
F-	Transflective
N-	No backlight
G-	STN-Gray
B-	6:00 view
W-	Wide Temp (-20°C ~ +70°C)
	<b>RoHS Compliant</b>

**Newhaven Display International, Inc.**

2511 Technology Drive, Suite 101

Elgin IL, 60124

Ph: 847-844-8795

Fax: 847-844-8796

[www.newhavendisplay.com](http://www.newhavendisplay.com)

[nhtech@newhavendisplay.com](mailto:nhtech@newhavendisplay.com)

[nhsales@newhavendisplay.com](mailto:nhsales@newhavendisplay.com)

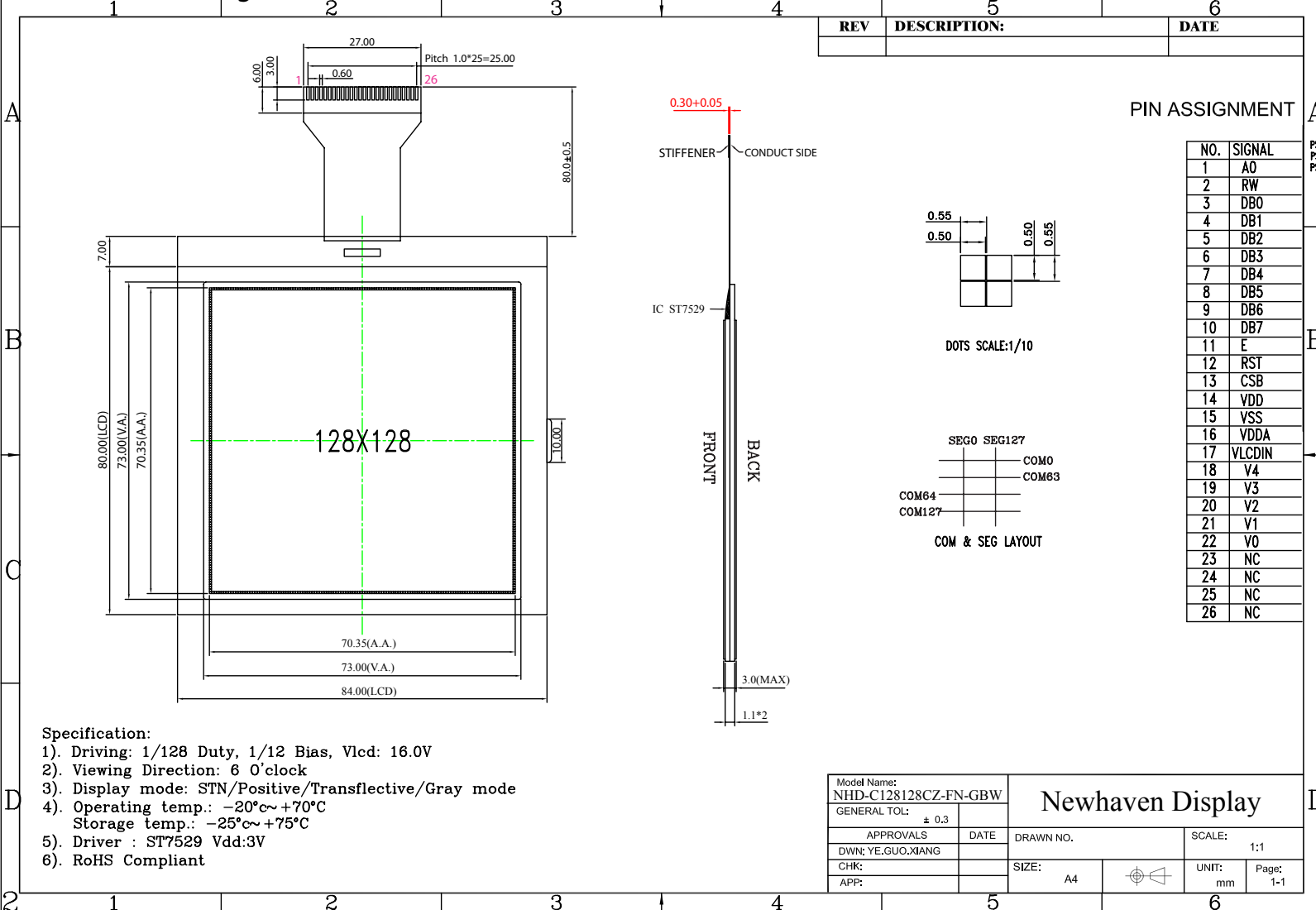
## Document Revision History

Revision	Date	Description	Changed by
0	6/17/2007	Initial Release	-
1	8/4/2009	User guide reformat	BE
2	10/14/2009	Updated Electrical Characteristic	MC

## Functions and Features

- 128 x 128 pixels
- Built-in ST7529 controller
- +3.0V power supply
- 1/128 duty cycle; 1/12 bias
- RoHS Compliant

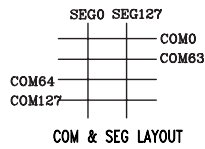
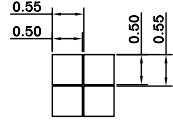
# Mechanical Drawing



REV	DESCRIPTION:	DATE

## PIN ASSIGNMENT

NO.	SIGNAL
1	A0
2	RW
3	DB0
4	DB1
5	DB2
6	DB3
7	DB4
8	DB5
9	DB6
10	DB7
11	E
12	RST
13	CSB
14	VDD
15	VSS
16	VDDA
17	VLCDIN
18	V4
19	V3
20	V2
21	V1
22	V0
23	NC
24	NC
25	NC
26	NC



- Specification:**
- 1). Driving: 1/128 Duty, 1/12 Bias, Vlcd: 16.0V
  - 2). Viewing Direction: 6 O'clock
  - 3). Display mode: STN/Positive/Transflective/Gray mode
  - 4). Operating temp.: -20°C~+70°C  
Storage temp.: -25°C~+75°C
  - 5). Driver : ST7529 Vdd:3V
  - 6). RoHS Compliant

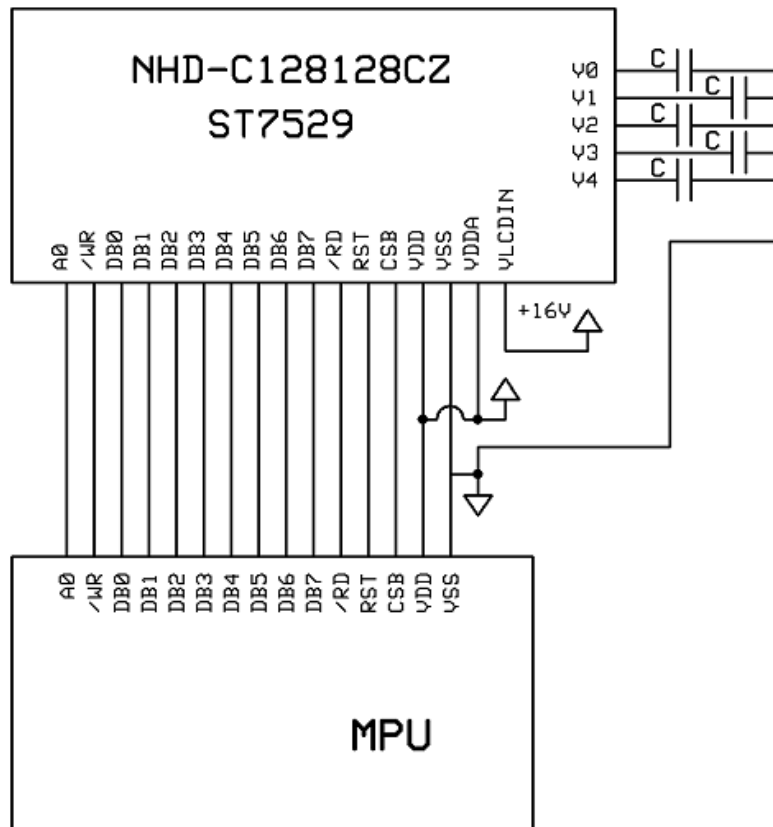
Model Name: <b>NHD-C128128CZ-FN-GBW</b>		<h1>Newhaven Display</h1>	
GENERAL TOL: ± 0.3			
APPROVALS	DATE	DRAWN NO.	SCALE: 1:1
DWN: YE.GUO.XIANG			
CHK:		SIZE: A4	UNIT: mm
APP:			Page: 1-1

## Pin Description and Wiring Diagram

Pin No.	Symbol	External Connection	Function Description
1	A0	MPU	Register select signal. A0=1: Data, A0=0: Command
2	/WR	MPU	Active LOW Write signal
3-10	DB0-DB7	MPU	Bi-directional 8-bit data bus.
11	/RD	MPU	Active LOW Read signal
12	RST	MPU	Active LOW Reset signal
13	CSB	MPU	Active LOW Chip select
14	VDD	Power Supply	Power supply for LCD and logic (+3V)
15	Vss	Power Supply	Ground
16	VDDA	Power Supply	Power supply for analog circuit (+3V)
17	VLCDIN	Power Supply	LCD driver supply voltage input (+16V)
18	V4	Power Supply	1.0uF-2.2uF cap to Vss
19	V3	Power Supply	1.0uF-2.2uF cap to Vss
20	V2	Power Supply	1.0uF-2.2uF cap to Vss
21	V1	Power Supply	1.0uF-2.2uF cap to Vss
22	V0	Power Supply	1.0uF-2.2uF cap to Vss
23-26	NC	-	No Connect

**Recommended LCD connector:** 1.0mm pitch, 26 pin FFC. Molex p/n: 52207-2685

**Backlight connector:** --- **Mates with:** ---



## Electrical Characteristics

Item	Symbol	Condition	Min.	Typ.	Max.	Unit
Operating Temperature Range	Top	Absolute Max	-20	-	+70	°C
Storage Temperature Range	Tst	Absolute Max	-25	-	+75	°C
Supply Voltage	VDD		-	3.0	-	V
Supply Current	IDD	Ta=25°C, VDD=3.0V	-	0.3	0.5	mA
Supply for LCD (contrast)	VDD-V0	Ta =25	-	16.0	-	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

## Optical Characteristics

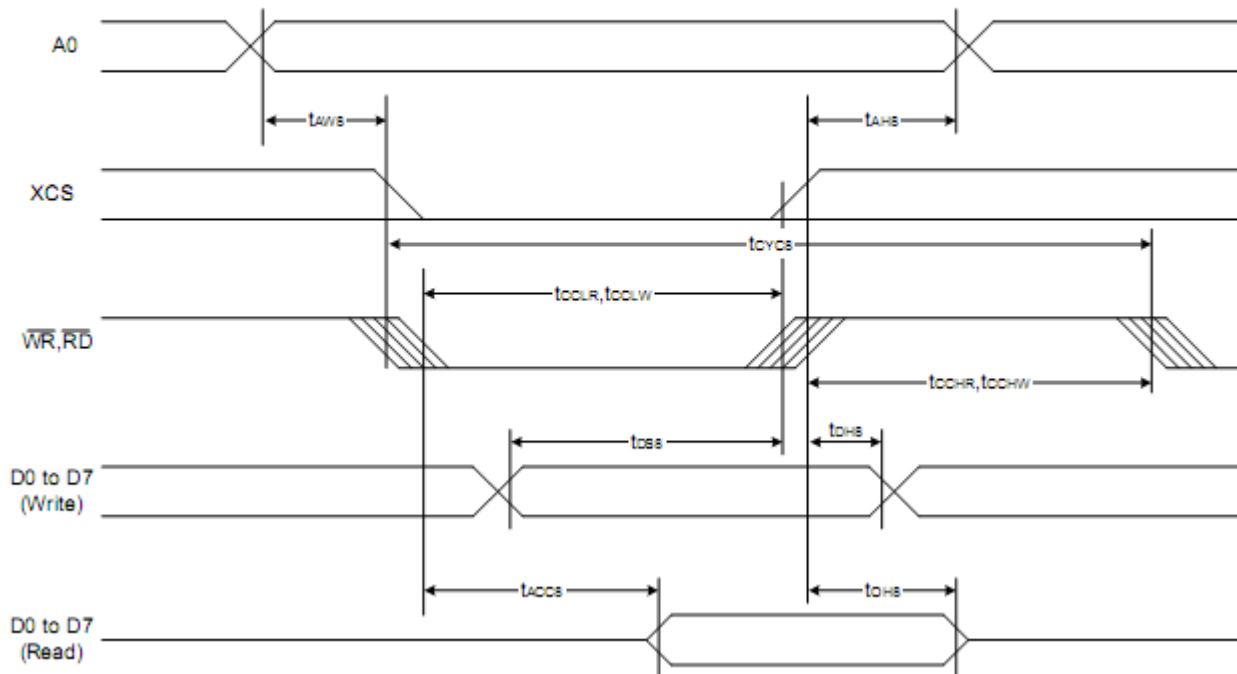
Item	Symbol	Condition	Min.	Typ.	Max.	Unit
Viewing Angle - Vertical		Cr≥2	-60	-	+35	°
Viewing Angle - Horizontal	Φ		-40	-	+40	°
Contrast Ratio	CR		-	6	-	-
Response Time (rise)	Tr	-	-	150	250	ms
Response Time (fall)	Tf	-	-	150	250	ms

## Controller Information

Built-in ST7529. Download specification at [http://www.newhavendisplay.com/app\\_notes/ST7529.pdf](http://www.newhavendisplay.com/app_notes/ST7529.pdf)

# Timing Characteristics

## System Bus Read/Write Characteristics 1 (For the 8080 Series MPU)



Item	Signal	Symbol	Condition	Rating		Units
				Min.	Max.	
Address hold time	A0	tAH8	-	20	-	ns
Address setup time		tAW8	-	20	-	
System cycle time		tCYC8	-	200	-	
Enable L pulse width (WRITE)	WR	tCCLW	-	100	-	
Enable H pulse width (WRITE)		tCCHW	-	100	-	
Enable L pulse width (READ)	RD	tCCLR	-	100	-	
Enable H pulse width (READ)		tCCHR	-	100	-	
WRITE Data setup time	D0 to D7	tDS8	-	150	-	
WRITE Address hold time		tDH8	-	20	-	
READ access time		tACC8	CL = 100 pF	-	40	
READ Output disable time		tOH8	CL = 100 pF	-	30	

## Table of Commands

Ext=0 or Ext=1

Index	Command	A0	RD	WR	D7	D6	D5	D4	D3	D2	D1	D0	Function	Hex	Parameter
1	Ext In	0	1	0	0	0	1	1	0	0	0	0	Ext=0 Set	30	None
2	Ext Out	0	1	0	0	0	1	1	0	0	0	1	Ext=1 Set	31	None

Index	Command	A0	RD	WR	D7	D6	D5	D4	D3	D2	D1	D0	Function	Hex	Parameter
1	DISON	0	1	0	1	0	1	0	1	1	1	1	Display On	AF	None
2	DISOFF	0	1	0	1	0	1	0	1	1	1	0	Display Off	AE	None
3	DISNOR	0	1	0	1	0	1	0	0	1	1	0	Normal Display	A6	None
4	DISINV	0	1	0	1	0	1	0	0	1	1	1	Inverse Display	A7	None
5	COMSCN	0	1	0	1	0	1	1	1	0	1	1	COM Scan Direction	BB	1 byte
6	DISCTRL	0	1	0	1	1	0	0	1	0	1	0	Display Control	CA	3 bytes
7	SLPIN	0	1	0	1	0	0	1	0	1	0	1	Sleep In	95	None
8	SLPOUT	0	1	0	1	0	0	1	0	1	0	0	Sleep Out	94	None
9	LASET	0	1	0	0	1	1	1	0	1	0	1	Line Address Set	75	2 bytes
10	CASET	0	1	0	0	0	0	1	0	1	0	1	Column Address Set	15	2 bytes
11	DATSDR	0	1	0	1	0	1	1	1	1	0	0	Data Scan Direction	BC	3 bytes
12	RAMWR	0	1	0	0	1	0	1	1	1	0	0	Writing to Memory	5C	Data
13	RAMRD	0	1	0	0	1	0	1	1	1	0	1	Reading from Memory	5D	Data
14	PTLIN	0	1	0	1	0	1	0	1	0	0	0	Partial display in	A8	2 bytes
15	PTLOUT	0	1	0	1	0	1	0	1	0	0	1	Partial display out	A9	None
16	RMWIN	0	1	0	1	1	1	0	0	0	0	0	Read and Modify Write	E0	None
17	RMWOUT	0	1	0	1	1	1	0	1	1	1	0	RMW end	EE	None
18	ASCSET	0	1	0	1	0	1	0	1	0	1	0	Area Scroll Set	AA	4 bytes
19	SCSTART	0	1	0	1	0	1	0	1	0	1	1	Scroll Start Set	AB	1 byte
20	OSCON	0	1	0	1	1	0	1	0	0	0	1	Internal OSC on	D1	None
21	OSCOFF	0	1	0	1	1	0	1	0	0	1	0	Internal OSC off	D2	None
22	PWRCTRL	0	1	0	0	0	1	0	0	0	0	0	Power Control	20	1 byte
23	VOLCTRL	0	1	0	1	0	0	0	0	0	0	1	EC control	81	2 bytes
24	VOLUP	0	1	0	1	1	0	1	0	1	1	0	EC increase 1	D6	None
25	VOLDOWN	0	1	0	1	1	0	1	0	1	1	1	EC decrease 1	D7	None
26	RESERVED	0	1	0	1	0	0	0	0	0	1	0	Not Use	82	0

Ext=0

27	EPSRRD1	0	1	0	0	1	1	1	1	1	0	0	READ Register1	7C	None
28	EPSRRD2	0	1	0	0	1	1	1	1	1	0	1	READ Register2	7D	None
29	NOP	0	1	0	0	0	1	0	0	1	0	1	NOP Instruction	25	None
30	STREAD	0	0	1	Read Data							Status Read			
31	EPINT	0	1	0	0	0	0	0	0	1	1	1	Initial code(1)	07	1 byte

**Ext=1**

<i>Index</i>	<i>Command</i>	<i>A0</i>	<i>RD</i>	<i>WR</i>	<i>D7</i>	<i>D6</i>	<i>D5</i>	<i>D4</i>	<i>D3</i>	<i>D2</i>	<i>D1</i>	<i>D0</i>	<i>Function</i>	<i>Hex</i>	<i>Parameter</i>
1	Gray 1 Set	0	1	0	0	0	1	0	0	0	0	0	FRAME 1 Gray PWM Set	20	16 bytes
2	Gray 2 Set	0	1	0	0	0	1	0	0	0	0	1	FRAME 2 Gray PWM Set	21	16 bytes
3	ANASET	0	1	0	0	0	1	1	0	0	1	0	Analog Circuit Set	32	3 bytes
4	SWINT	0	1	0	0	0	1	1	0	1	0	0	Software Initial	34	None
5	EPCTIN	0	1	0	1	1	0	0	1	1	0	1	Control EEPROM	CD	1 byte
6	EPCOUT	0	1	0	1	1	0	0	1	1	0	0	Cancel EEPROM	CC	None
7	EPMWR	0	1	0	1	1	1	1	1	1	0	0	Write to EEPROM	FC	None
8	EPMRD	0	1	0	1	1	1	1	1	1	0	1	Read from EEPROM	FD	None



## Example Initialization Program

```
/******  
void write_command(unsigned char i)  
{  
A0=0; /*Instruction register*/  
E=1; /*Read inactive*/  
P1 = i; /*put data on port 1*/  
CSB=0; /*Chip select active*/  
RW=0; /*Write active*/  
RW=1; /*Write inactive; latch in data*/  
CSB=1; /*Chip select inactive*/  
}  
/******  
/******  
void write_data(unsigned char i)  
{  
A0=1; /*DDRAM data register*/  
E=1;  
P1 = i;  
CSB=0;  
RW=0;  
RW=1;  
CSB=1;  
}  
/******  
/******  
void initEEPROM(void){  
write_command(0x30); //ext=0  
write_command(0x07);  
write_data(0x19);  
write_command(0x31); //ext=1  
write_command(0xCD);  
write_data(0x00);  
delay(8);  
write_command(0xFD);  
delay(4);  
write_command(0xCC);  
write_command(0x30); //ext=0  
}  
/******  
/******  
void lcd_init(void){ //ST7529  
write_command(0x30); //extended set off  
write_command(0x94); //sleep out  
write_command(0xD1); //OCS on  
delay(2);  
write_command(0x20); //power control  
write_data(0x0B); //booster  
delay(8);  
write_command(0x81); //electronic control  
write_data(0x3F); //vop=14.0v  
write_data(0x04);  
write_command(0xCA); //display control  
write_data(0x00); //CL=X1  
write_data(0x27); //Duty=128  
write_data(0x00); //FR set  
write_command(0xA7); //normal display  
write_command(0xBB); //com direction  
write_data(0x01);  
write_command(0xBC); //scan direction  
write_data(0x01); //normal  
write_data(0x00); //RGB arrangement  
write_data(0x02); //65k color  
write_command(0x31); //ext instruction  
write_command(0x32); //analog circuit set  
write_data(0x06); //osc frequency  
write_data(0x01); //booster efficiency  
write_data(0x00); //bias = 1/4  
write_command(0x22);
```

```

write_data(0x03);
write_data(0x02);
write_data(0x02);
write_command(0x34);           //software init
initEEPROM();
write_command(0xAF);           //display on
}
/*****/

```

## Quality Information

Test Item	Content of Test	Test Condition	Note
High Temperature storage	Endurance test applying the high storage temperature for a long time.	+75°C , 48hrs	2
Low Temperature storage	Endurance test applying the low storage temperature for a long time.	-25°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](http://www.newhavendisplay.com/specs/precautions.pdf)

## Warranty Information and Terms & Conditions

[http://www.newhavendisplay.com/index.php?main\\_page=terms](http://www.newhavendisplay.com/index.php?main_page=terms)