

# User's Guide

## **NHD-C12864EZ-FSW-FTW-P**

# **LCM** (Liquid Crystal Display Graphic Module)

**COG- RoHS Compliant**

<b>NHD-</b>	Newhaven Display
<b>12864-</b>	128 x 64 Dots
<b>EZ-</b>	Version Line
<b>F-</b>	Transflective
<b>SW-</b>	Side White LED B/L
<b>F-</b>	FSTN (+)
<b>T-</b>	12:00 View
<b>W-</b>	Wide Temperature (-20 ~ +70c)
<b>P-</b>	8- Pin Ribbon

For product support, contact

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**Newhaven Display International**  
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January 14, 2009

## DOCUMENT REVISION HISTORY

Version	DATE	DESCRIPTION	CHANGED BY
00	27-JULY-2007	First issue	

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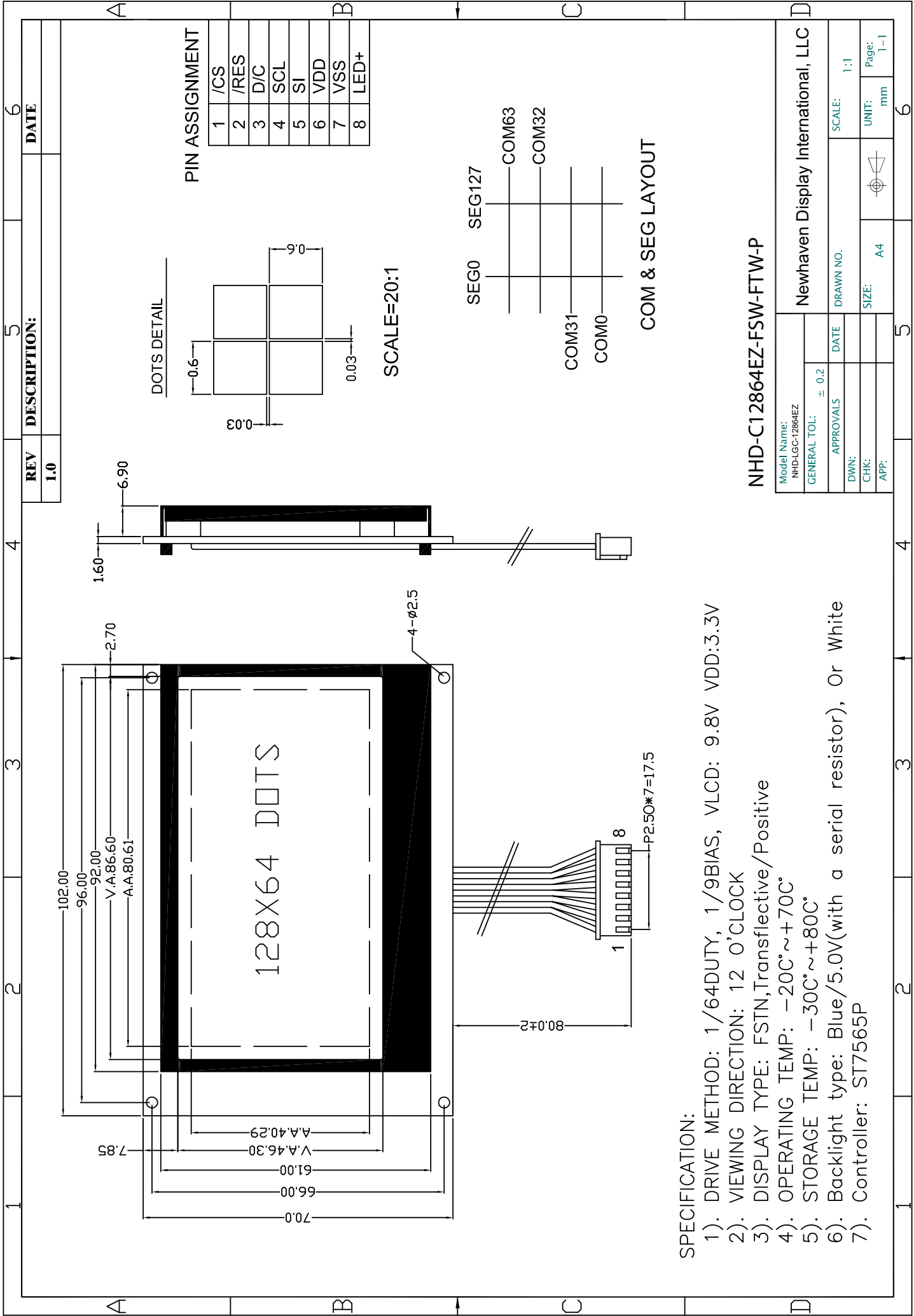
## 1.Features

1. 128X64 dots
2. Built-in controller (ST7565)
3. +3.3V power supply
4. 1/64 duty cycle;1/9bias
5. BKL to be driven by A, K.

<b>LCD type</b>	<input checked="" type="checkbox"/> FSTN positive		<input type="checkbox"/> FSTN Negative	
	<input type="checkbox"/> STN Yellow Green	<input type="checkbox"/> STN Gray		<input type="checkbox"/> STN-Blue
<b>View direction</b>	<input checked="" type="checkbox"/> 6 O'clock		<input type="checkbox"/> 12 O'clock	
<b>Rear Polarizer</b>	<input type="checkbox"/> Reflective		<input checked="" type="checkbox"/> Transflective	<input type="checkbox"/> Transmissive
<b>Backlight Type</b>	<input checked="" type="checkbox"/> LED	<input type="checkbox"/> EL	<input type="checkbox"/> Internal Power	<input type="checkbox"/> 4.2V input
		<input type="checkbox"/> CCFL	<input checked="" type="checkbox"/> External Power	<input checked="" type="checkbox"/> 3.3 input
<b>Backlight Color</b>	<input checked="" type="checkbox"/> White	<input type="checkbox"/> Amber	<input type="checkbox"/> Blue-Green	<input type="checkbox"/> Yellow-Green
<b>Temperature Range</b>	<input type="checkbox"/> Normal		<input checked="" type="checkbox"/> Wide	<input type="checkbox"/> Super Wide
<b>DC to DC circuit</b>	<input checked="" type="checkbox"/> Build-in		<input type="checkbox"/> Not Build-in	
<b>EI Driver IC</b>	<input type="checkbox"/> Build-in		<input checked="" type="checkbox"/> Not Build-in	
<b>Touch screen</b>	<input type="checkbox"/> With		<input checked="" type="checkbox"/> Without	
<b>Font type</b>	<input type="checkbox"/> English-Japanese	<input type="checkbox"/> English-European	<input type="checkbox"/> English-Russian	<input checked="" type="checkbox"/> other
	<input checked="" type="checkbox"/> ROHS			

## 2. MECHANICAL SPECIFICATIONS

Module size	102.0mm(L)*70.0mm(W)* Max9.5(H)mm
Viewing area	86.6mm(L)*46.3mm(W)
Dots size	0.60mm(L)*0.60mm(W)
Dots pitch	0.63mm(L)*0.63mm(W)
Weight	Approx.



NHD-C12864EZ-FSW-FTW-P

Model Name: NHD-LGC-12864EZ		Newhaven Display International, LLC	
GENERAL TOL:	± 0.2	DRAWN NO.	SCALE: 1:1
APPROVALS	DATE	SIZE: A4	UNIT: mm
DWN:			Page: 1-1
CHK:			
APP:			

- SPECIFICATION:
- 1). DRIVE METHOD: 1/64DUTY, 1/9BIAS, VLCD: 9.8V VDD:3.3V
  - 2). VIEWING DIRECTION: 12 O'CLOCK
  - 3). DISPLAY TYPE: FSTN,Transflective/Positive
  - 4). OPERATING TEMP: -20C°~+70C°
  - 5). STORAGE TEMP: -30C°~+80C°
  - 6). Backlight type: Blue/5.0V(with a serial resistor), Or White
  - 7). Controller: ST7565P

#### 4.Absolute maximum ratings

Item	Symbol	Standard			Unit
Power voltage	$V_{DD}-V_{SS}$	0.3	-	3.6	V
Input voltage	$V_{IN}$	VSS	-	VDD	
Operating temperature range	$V_{OP}$	-20	-	+70	°C
Storage temperature range	$V_{ST}$	-30	-	+80	

#### 5.Interface pin description

Pin no.	Symbol	External connection	Function
1	/CS	MPU	Used to enter chip select signal
2	/RESET	MPU	Controller reset (module reset)
3	D/C	MPU	Register select signal
4	SCL	MPU	Serial clock input
5	SI	MPU	Serial data input
6	$V_{DD}$	Power supply	Power supply for LCM (+3.3V)
7	$V_{SS}$		Signal ground for logic (GND)
8	LED+	Power supply for BKL	Power supply for BKL (+3.3V)

#### 6.Optical characteristics

FSTN type display module ( $T_a=25^{\circ}\text{C}$ ,  $V_{DD}=3.3\text{V}$ )

Item	Symbol	Condition	Min.	Typ.	Max.	Unit
Viewing angle	$\theta$	$C_r \geq 2$	-60	-	35	deg
	$\Phi$		-40	-	40	
Contrast ratio	$C_r$		-	6	-	-
Response time (rise)	$T_r$	-	-	150	250	ms
Response time (fall)	$T_f$	-	-	150	250	

#### 7.Electrical characteristics

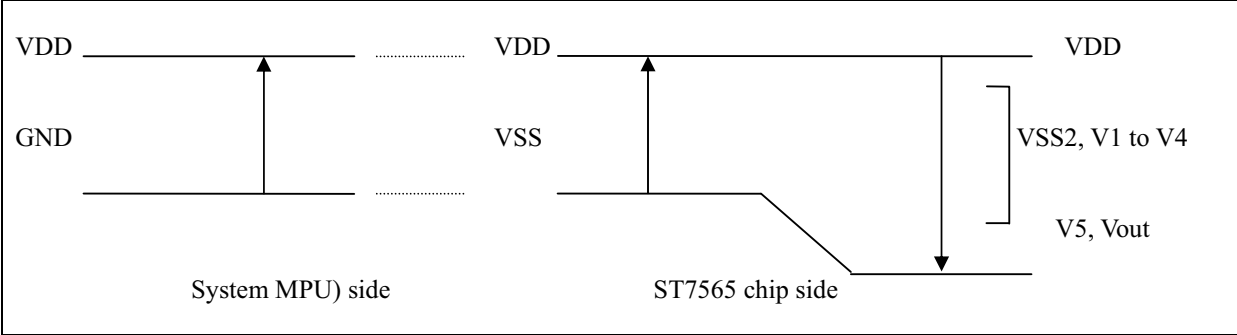
DC characteristics

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Supply voltage for LCD	$V_{DD}-V_0$	$T_a = 25^{\circ}\text{C}$	9.5	9.8	10.2	V
Input voltage	$V_{DD}$		2.4	3.3	3.3	
Supply current	$I_{DD}$	$T_a=25^{\circ}\text{C}$ , $V_{DD}=3.3\text{V}$	-	-	147	$\mu\text{A}$
Input leakage current	$I_{LKG}$		-	-	1.0	$\mu\text{A}$
“H” level input voltage	$V_{IH}$		2.2	-	$V_{DD}$	V
“L” level input voltage	$V_{IL}$	Twice initial value or less	0	-	0.6	
“H” level output voltage	$V_{OH}$	LOH=-0.25mA	2.4	-	-	
“L” level output voltage	$V_{OL}$	LOH=1.6mA	-	-	0.4	
Backlight supply voltage	$V_F$		-	3.3	-	
Backlight supply current	$I_{LED}$	$V_F=3.3\text{V}$	-	16	-	mA

8. Absolute Maximum Ratings

(Unless otherwise noted, VSS=0V)

Parameter		Symbol	Conditions	Unit
Power Supply Voltage		VDD	-0.3 to +3.6	V
Power supply voltage (3) (VDD standard)		V5, Vout	-14.5.0 to +0.3	V
Power supply voltage (4) (VDD standard)		V1,V2,V3,V4	V5 to +0.3	V
Input Voltage		Vin	-0.3 to VDD+0.3	V
Output voltage		Vo	-0.3 to VDD+0.3	V
Operating Temp.		Topr	-40 to 80	C
Storage Temp.	Bare chip	Tstr	-40 to +80	C



## 9. Timing Characteristics

### The Serial Interface

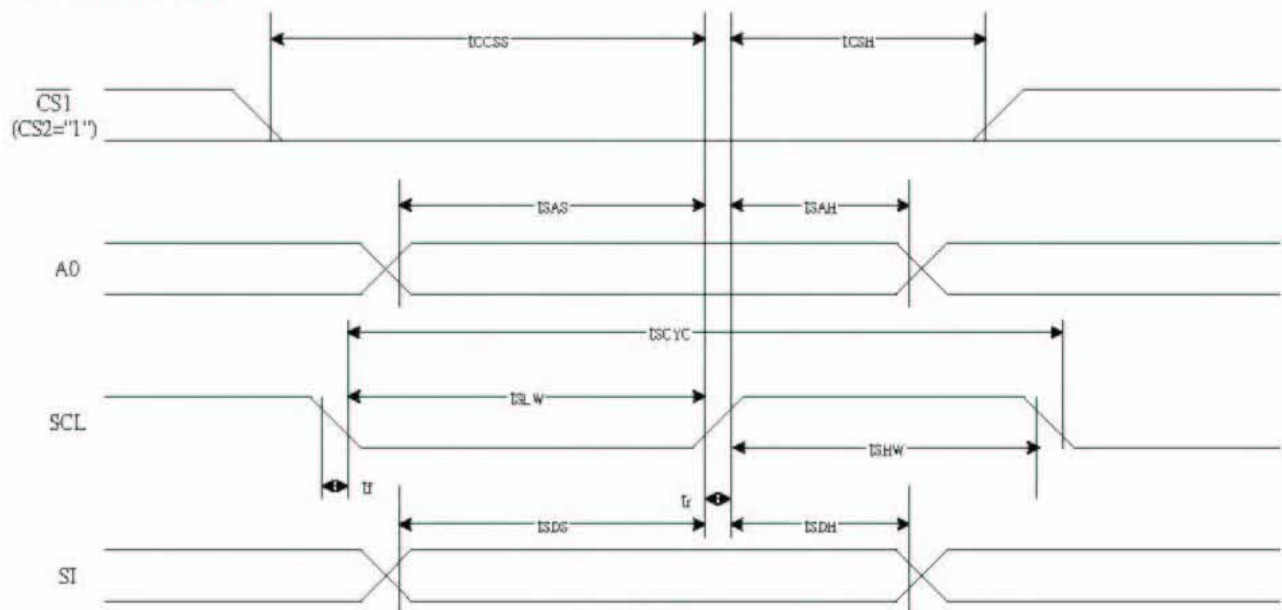


Figure 39

Table 30

(VDD = 3.3V, Ta = -30 to 85°C)

Item	Signal	Symbol	Condition	Rating		Units
				Min.	Max.	
Serial Clock Period	SCL	$T_{scyc}$		50	—	ns
SCL "H" pulse width		$T_{shw}$		25	—	
SCL "L" pulse width		$T_{SLW}$		25	—	
Address setup time	A0	$T_{SAS}$		20	—	
Address hold time		$T_{SAH}$		10	—	
Data setup time	SI	$T_{SDS}$		20	—	
Data hold time		$T_{SDH}$		10	—	
CS-SCL time	CS	$T_{css}$		20	—	
CS-SCL time		$T_{csh}$		40	—	

Table 31

(VDD = 2.7V, Ta = -30 to 85°C)

Item	Signal	Symbol	Condition	Rating		Units
				Min.	Max.	
Serial Clock Period	SCL	$T_{scyc}$		100	—	ns
SCL "H" pulse width		$T_{SHW}$		50	—	
SCL "L" pulse width		$T_{SLW}$		50	—	
Address setup time	A0	$T_{SAS}$		30	—	
Address hold time		$T_{SAH}$		20	—	
Data setup time	SI	$T_{SDS}$		30	—	
Data hold time		$T_{SDH}$		20	—	
CS-SCL time	CS	$T_{CSS}$		30	—	
CS-SCL time		$T_{CSH}$		60	—	



## 10. Table of LCM commands

Command	Command Code											Function
	A0	/RD	/WR	D7	D6	D5	D4	D3	D2	D1	D0	
(1) Display ON/OFF	0	1	0	1	0	1	0	1	1	1	0	LCD display ON/OFF 0: OFF, 1: ON
(2) Display start line set	0	1	0	0	1	Display start address					Sets the display RAM display start line address	
(3) Page address set	0	1	0	1	0	1	1	Page address				Sets the display RAM page address
(4) Column address set upper bit	0	1	0	0	0	0	1	Most significant column address				Sets the most significant 4 bits of the display RAM column address
Column address set lower bit	0	1	0	0	0	0	0	Least significant column address				Sets the least significant 4 bits of the display RAM column address.
(5) Status read	0	0	1	Status				0	0	0	0	Reads the status data
(6) Display data write	1	1	0	Write data							Writes to the display RAM	
(7) Display data read	1	0	1	Read data							Reads from the display RAM	
(8) ADC select	0	1	0	1	0	1	0	0	0	0	0	Sets the display RAM address SEG output correspondence 0: normal, 1: reverse
(9) Display normal/reverse	0	1	0	1	0	1	0	0	1	1	0	Sets the LCD display normal/reverse 0: normal, 1: reverse
(10) Display all points ON/OFF	0	1	0	1	0	1	0	0	1	0	0	Display all points 0: normal display 1: all points ON
(11) LCD bias set	0	1	0	1	0	1	0	0	0	1	0	Sets the LCD drive voltage bias ratio 0: 1/9 bias, 1: 1/7 bias (ST7565P)
(12) Read/modify/write	0	1	0	1	1	1	0	0	0	0	0	Column address increment At write: +1 At read: 0
(13) End	0	1	0	1	1	1	0	1	1	1	0	Clear read/modify/write
(14) Reset	0	1	0	1	1	1	0	0	0	1	0	Internal reset
(15) Common output mode select	0	1	0	1	1	0	0	0	*	*	*	Select COM output scan direction 0: normal direction 1: reverse direction
(16) Power control set	0	1	0	0	0	1	0	1	Operating mode		Select internal power supply operating mode	
(17) V <sub>0</sub> voltage regulator internal resistor ratio set	0	1	0	0	0	1	0	0	Resistor ratio		Select internal resistor ratio(R <sub>b</sub> /R <sub>a</sub> ) mode	
(18) Electronic volume mode set Electronic volume register set	0	1	0	1	0	0	0	0	0	0	1	Set the V <sub>0</sub> output voltage electronic volume register
(19) Static indicator ON/OFF Static indicator register set	0	1	0	1	0	1	0	1	1	0	0	0: OFF, 1: ON
				0	0	0	0	0	0	0	0	Mode
(20) Booster ratio set	0	1	0	1	1	1	1	1	0	0	0	select booster ratio 00: 2x,3x,4x 01: 5x 11: 6x
(21) Power saver												Display OFF and display all points ON compound command
(22) NOP	0	1	0	1	1	1	0	0	0	1	1	Command for non-operation
(23) Test	0	1	0	1	1	1	1	*	*	*	*	Command for IC test. Do not use this command



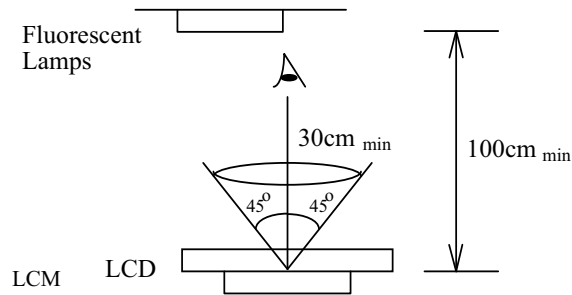
## 11.QUALITY SPECIFICATIONS

### 11.1 Standard of the product appearance test

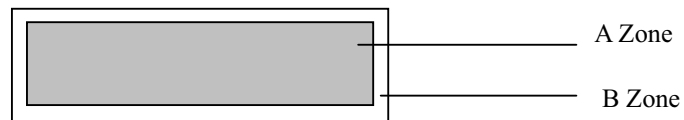
Manner of appearance test: The inspection should be performed in using 20W x 2 fluorescent lamps.

Distance between LCM and fluorescent lamps should be 100 cm or more. Distance between LCM and inspector eyes should be 30 cm or more.

Viewing direction for inspection is 45° from vertical against LCM.



Definition of zone:



A Zone: Active display area (minimum viewing area).

B Zone: Non-active display area (outside viewing area).

**11.2 Specification of quality assurance**


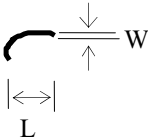
AQL inspection standard

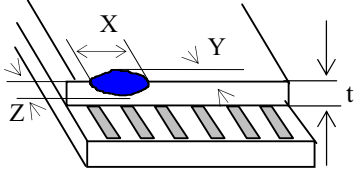
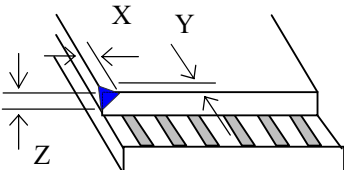
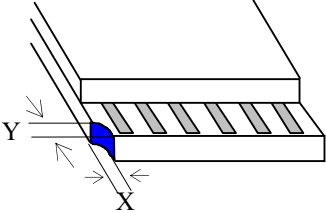
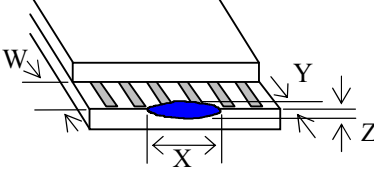
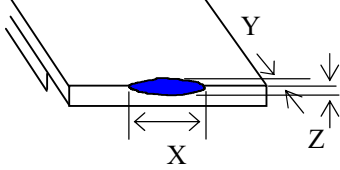
Sampling method: MIL-STD-105E, Level II, single sampling

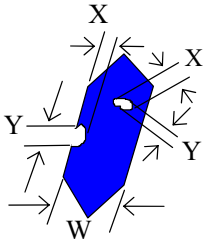
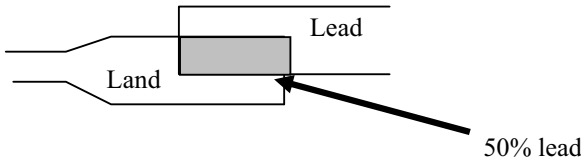
Defect classification **(Note: \* is not including)**

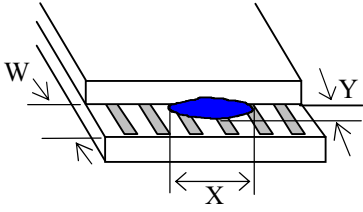
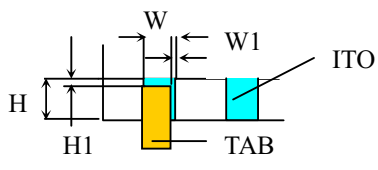
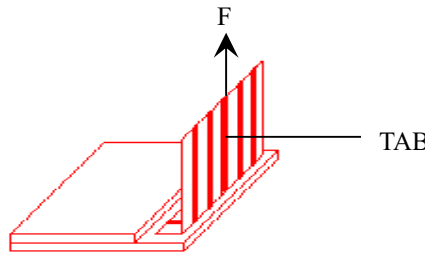
Classify	Item		Note	AQL
Major	Display state	Short or open circuit	1	0.65
		LC leakage		
		Flickering		
		No display		
		Wrong viewing direction		
		Contrast defect (dim, ghost)	2	
		Back-light	1,8	
	Non-display	Flat cable or pin reverse	10	
		Wrong or missing component	11	
Minor	Display state	Background color deviation	2	1.0
		Black spot and dust	3	
		Line defect, Scratch	4	
		Rainbow	5	
		Chip	6	
		Pin hole	7	
		Protruded	12	
		Bubble and foreign material	3	
	Soldering	Poor connection	9	
	Wire	Poor connection	10	
	TAB	Position, Bonding strength	13	

**Note on defect classification**

No.	Item	Criterion																				
1	Short or open circuit	Not allow																				
	LC leakage																					
	Flickering																					
	No display																					
	Wrong viewing direction																					
	Wrong Back-light																					
2	Contrast defect	Refer to approval sample																				
	Background color deviation																					
3	Point defect, Black spot, dust (including Polarizer)	<div></div> <table><thead><tr><th>Point Size</th><th>Acceptable Qty.</th></tr></thead><tbody><tr><td><math>\phi \leq 0.10</math></td><td>Disregard</td></tr><tr><td><math>0.10 &lt; \phi \leq 0.20</math></td><td>3</td></tr><tr><td><math>0.20 &lt; \phi \leq 0.25</math></td><td>2</td></tr><tr><td><math>0.25 &lt; \phi \leq 0.30</math></td><td>1</td></tr><tr><td><math>\phi &gt; 0.30</math></td><td>0</td></tr></tbody></table> <div>Unit : mm</div>	Point Size	Acceptable Qty.	$\phi \leq 0.10$	Disregard	$0.10 < \phi \leq 0.20$	3	$0.20 < \phi \leq 0.25$	2	$0.25 < \phi \leq 0.30$	1	$\phi > 0.30$	0								
	Point Size		Acceptable Qty.																			
$\phi \leq 0.10$	Disregard																					
$0.10 < \phi \leq 0.20$	3																					
$0.20 < \phi \leq 0.25$	2																					
$0.25 < \phi \leq 0.30$	1																					
$\phi > 0.30$	0																					
	$\phi = (X+Y)/2$																					
4	Line defect, Scratch	<div></div> <table><thead><tr><th colspan="2">Line</th><th>Acceptable Qty.</th></tr><tr><th>L</th><th>W</th><th></th></tr></thead><tbody><tr><td>---</td><td><math>0.015 \geq W</math></td><td>Disregard</td></tr><tr><td><math>3.0 \geq L</math></td><td><math>0.03 \geq W</math></td><td rowspan="2">2</td></tr><tr><td><math>2.0 \geq L</math></td><td><math>0.05 \geq W</math></td></tr><tr><td><math>1.0 \geq L</math></td><td><math>0.1 &gt; W</math></td><td>1</td></tr><tr><td>---</td><td><math>0.05 &lt; W</math></td><td>Applied as point defect</td></tr></tbody></table> <div>Unit: mm</div>	Line		Acceptable Qty.	L	W		---	$0.015 \geq W$	Disregard	$3.0 \geq L$	$0.03 \geq W$	2	$2.0 \geq L$	$0.05 \geq W$	$1.0 \geq L$	$0.1 > W$	1	---	$0.05 < W$	Applied as point defect
	Line		Acceptable Qty.																			
L	W																					
---	$0.015 \geq W$	Disregard																				
$3.0 \geq L$	$0.03 \geq W$	2																				
$2.0 \geq L$	$0.05 \geq W$																					
$1.0 \geq L$	$0.1 > W$	1																				
---	$0.05 < W$	Applied as point defect																				
5	Rainbow	Not more than two color changes across the viewing area.																				

No	Item	Criterion																																	
6	Chip  Remark: X: Length direction Y: Short direction Z: Thickness direction t: Glass thickness W: Terminal Width	<div>  <table> <caption>Acceptable criterion</caption> <tr> <th>X</th><th>Y</th><th>Z</th></tr> <tr> <td><math>\leq 2</math></td><td>0.5mm</td><td><math>\leq t/2</math></td></tr> </table> </div> <div>  <table> <caption>Acceptable criterion</caption> <tr> <th>X</th><th>Y</th><th>Z</th></tr> <tr> <td><math>\leq 2</math></td><td>0.5mm</td><td><math>\leq t</math></td></tr> </table> </div> <div>  <table> <caption>Acceptable criterion</caption> <tr> <th>X</th><th>Y</th><th>Z</th></tr> <tr> <td><math>\leq 3</math></td><td><math>\leq 2</math></td><td><math>\leq t</math></td></tr> <tr> <td colspan="2">shall not reach to ITO</td><td></td></tr> </table> </div> <div>  <table> <caption>Acceptable criterion</caption> <tr> <th>X</th><th>Y</th><th>Z</th></tr> <tr> <td>Disregard</td><td><math>\leq 0.2</math></td><td><math>\leq t</math></td></tr> </table> </div> <div>  <table> <caption>Acceptable criterion</caption> <tr> <th>X</th><th>Y</th><th>Z</th></tr> <tr> <td><math>\leq 5</math></td><td><math>\leq 2</math></td><td><math>\leq t/3</math></td></tr> </table> </div>	X	Y	Z	$\leq 2$	0.5mm	$\leq t/2$	X	Y	Z	$\leq 2$	0.5mm	$\leq t$	X	Y	Z	$\leq 3$	$\leq 2$	$\leq t$	shall not reach to ITO			X	Y	Z	Disregard	$\leq 0.2$	$\leq t$	X	Y	Z	$\leq 5$	$\leq 2$	$\leq t/3$
X	Y	Z																																	
$\leq 2$	0.5mm	$\leq t/2$																																	
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X	Y	Z																																	
$\leq 5$	$\leq 2$	$\leq t/3$																																	

No.	Item	Criterion								
7	Segment pattern W = Segment width $\phi = (X+Y)/2$	<p>(1) Pin hole <math>\phi &lt; 0.10\text{mm}</math> is acceptable.</p> <div><table><tr><th>Point Size</th><th>Acceptable Qty</th></tr><tr><td><math>\phi \leq 1/4W</math></td><td>Disregard</td></tr><tr><td><math>1/4W &lt; \phi \leq 1/2W</math></td><td>1</td></tr><tr><td><math>\phi &gt; 1/2W</math></td><td>0</td></tr></table></div>	Point Size	Acceptable Qty	$\phi \leq 1/4W$	Disregard	$1/4W < \phi \leq 1/2W$	1	$\phi > 1/2W$	0
Point Size	Acceptable Qty									
$\phi \leq 1/4W$	Disregard									
$1/4W < \phi \leq 1/2W$	1									
$\phi > 1/2W$	0									
8	Back-light	<p>(1) The color of backlight should correspond its specification.</p> <p>(2) Not allow flickering</p>								
9	Soldering	<p>(1) Not allow heavy dirty and solder ball on PCB. (The size of dirty refer to point and dust defect)</p> <p>(2) Over 50% of lead should be soldered on Land.</p> <div></div>								
10	Wire	<p>(1) Copper wire should not be rusted</p> <p>(2) Not allow crack on copper wire connection.</p> <p>(3) Not allow reversing the position of the flat cable.</p> <p>(4) Not allow exposed copper wire inside the flat cable.</p>								
11*	PCB	<p>(1) Not allow screw rust or damage.</p> <p>(2) Not allow missing or wrong putting of component.</p>								

No	Item	Criterion
12	Protruded W: Terminal Width	 <p>Acceptable criteria: <math>Y \leq 0.4</math></p>
13	TAB	<p>1. Position</p>  <div style="border: 1px solid black; padding: 5px; width: fit-content;"> <math>W1 \leq 1/3 W</math>  <math>H1 \leq 1/3 H</math> </div> <p>2 TAB bonding strength test</p>  <p><math>P (=F/\text{TAB bonding width}) \geq 650\text{gf/cm}</math> ,(speed rate: 1mm/min)  5pcs per SOA (shipment)</p>
14	Total no. of acceptable Defect	<p>A. Zone</p> <p>Maximum 2 minor non-conformities per one unit.</p> <p>Defect distance: each point to be separated over 10mm</p> <p>B. Zone</p> <p>It is acceptable when it is no trouble for quality and assembly in customer's end product.</p>

### 11.3 Reliability of LCM

Reliability test condition:

Item	Condition	Time (hrs)	Assessment
High temp. Storage	80°C	48	No abnormalities in functions and appearance
High temp. Operating	70°C	48	
Low temp. Storage	-30°C	48	
Low temp. Operating	-20°C	48	
Humidity	40°C/ 90%RH	48	
Temp. Cycle	0°C ← 25°C → 50°C (30 min ← 5 min → 30min)	10cycles	

Recovery time should be 24 hours minimum. Moreover, functions, performance and appearance shall be free from remarkable deterioration within 50,000 hours under ordinary operating and storage conditions room temperature (20±8°C), normal humidity (below 65% RH), and in the area not exposed to direct sun light.

### 11.4 Precaution for using LCD/LCM

LCD/LCM is assembled and adjusted with a high degree of precision. Do not attempt to make any alteration or modification. The followings should be noted.

#### General Precautions:

1. LCD panel is made of glass. Avoid excessive mechanical shock or applying strong pressure onto the surface of display area.
2. The polarizer used on the display surface is easily scratched and damaged. Extreme care should be taken when handling. To clean dust or dirt off the display surface, wipe gently with cotton, or other soft material soaked with isopropyl alcohol, ethyl alcohol or trichlorotrifluoroethane, do not use water, ketone or aromatics and never scrub hard.
3. Do not tamper in any way with the tabs on the metal frame.
4. Do not make any modification on the PCB without consulting Newhaven Display.
5. When mounting a LCM, make sure that the PCB is not under any stress such as bending or twisting. Elastomer contacts are very delicate and missing pixels could result from slight dislocation of any of the elements.
6. Avoid pressing on the metal bezel, otherwise the elastomer connector could be deformed and lose contact, resulting in missing pixels and also cause rainbow on the display.
7. Be careful not to touch or swallow liquid crystal that might leak from a damaged cell. Any liquid crystal adheres to skin or clothes, wash it off immediately with soap and water.

#### Static Electricity Precautions:

1. CMOS-LSI is used for the module circuit; therefore operators should be grounded whenever he/she comes into contact with the module.
2. Do not touch any of the conductive parts such as the LSI pads; the copper leads on the PCB and the interface terminals with any parts of the human body.
3. Do not touch the connection terminals of the display with bare hand; it will cause disconnection or defective insulation of terminals.
4. The modules should be kept in anti-static bags or other containers resistant to static for storage.
5. Only properly grounded soldering irons should be used.
6. If an electric screwdriver is used, it should be grounded and shielded to prevent sparks.
7. The normal static prevention measures should be observed for work clothes and working benches.
  1. Since dry air is inductive to static, a relative humidity of 50-60% is recommended.



**Soldering Precautions:**

1. Soldering should be performed only on the I/O terminals.
2. Use soldering irons with proper grounding and no leakage.
3. Soldering temperature: 280°C+10°C
4. Soldering time: 3 to 4 second.
5. Use eutectic solder with resin flux filling.
6. If flux is used, the LCD surface should be protected to avoid spattering flux.
7. Flux residue should be removed.

**Operation Precautions:**

1. The viewing angle can be adjusted by varying the LCD driving voltage  $V_o$ .
2. Since applied DC voltage causes electro-chemical reactions, which deteriorate the display, the applied pulse waveform should be a symmetric waveform such that no DC component remains. Be sure to use the specified operating voltage.
3. Driving voltage should be kept within specified range; excess voltage will shorten display life.
4. Response time increases with decrease in temperature.
5. Display color may be affected at temperatures above its operational range.
6. Keep the temperature within the specified range usage and storage. Excessive temperature and humidity could cause polarization degradation, polarizer peel-off or generate bubbles.
7. For long-term storage over 40°C is required, the relative humidity should be kept below 60%, and avoid direct sunlight.

**Limited Warranty**

Newhaven Display LCDs and modules are not consumer products, but may be incorporated by Newhaven's customers into consumer products or components thereof. Newhaven does not warrant that its LCDs and components are fit for any such particular purpose.

1. The liability of Newhaven is limited to repair or replacement on the terms set forth below. Newhaven will not be responsible for any subsequent or consequential events or injury or damage to any personnel or user including third party personnel and/or user. Unless otherwise agreed in writing between Newhaven and the customer, Newhaven will only replace or repair any of its LCD which is found defective electrically or visually when inspected in accordance with Newhaven general LCD inspection standard. (Copies available on request)
2. No warranty can be granted if any of the precautions state in handling liquid crystal display above has been disregarded. Broken glass, scratches on polarizer mechanical damages as well as defects that are caused accelerated environment tests are excluded from warranty.
3. In returning the LCD/LCM, they must be properly packaged; there should be detailed description of the failures or defect.