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sales@integrated-circuit.com

NHD-C12864HZ-FN-FBW

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

NHD-	Newhaven Display
C12864-	128 x 64 pixels
HZ-	Model
F-	Transflective
N-	No backlight
F-	FSTN (+)
B-	6:00 view
W-	Wide Temp (-20°C ~ +70°C)
	RoHS Compliant

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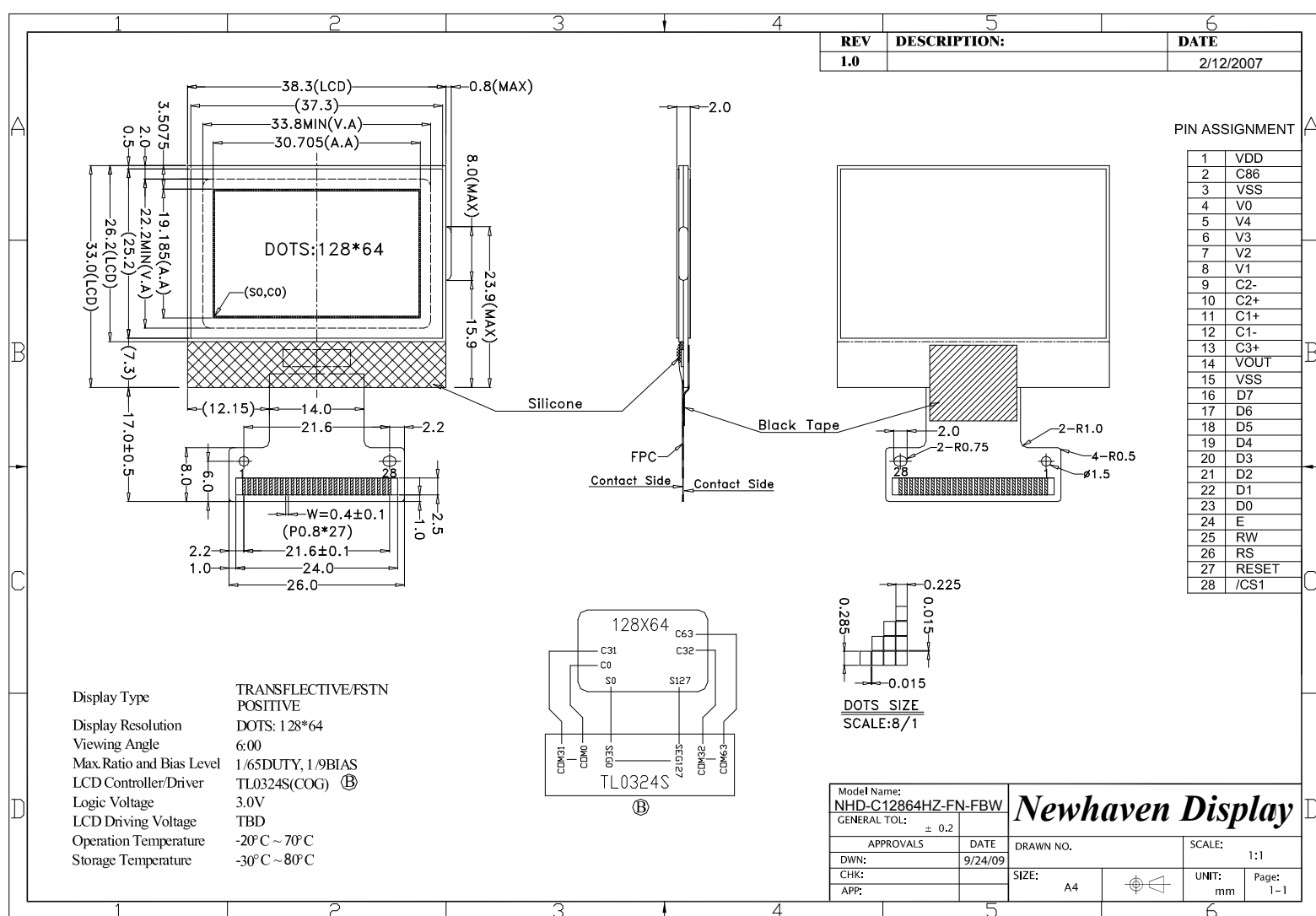
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Document Revision History

Revision	Date	Description	Changed by
0	1/29/2008	Initial Release	-
1	9/29/2009	User guide reformat	BE
2	10/13/2009	Updated Electrical Characteristic	MC
3	12/4/2009	Corrected Storage Temperature	MC
4	3/10/2010	Corrected Pin 28 to "Active LOW chip select"	MC

Functions and Features

- 128 x 64 Pixels
- Built-in TL0324S controller
- 3.0V Power Supply
- 1/65 duty cycle; 1/9 bias
- Parallel Interface
- RoHS Compliant

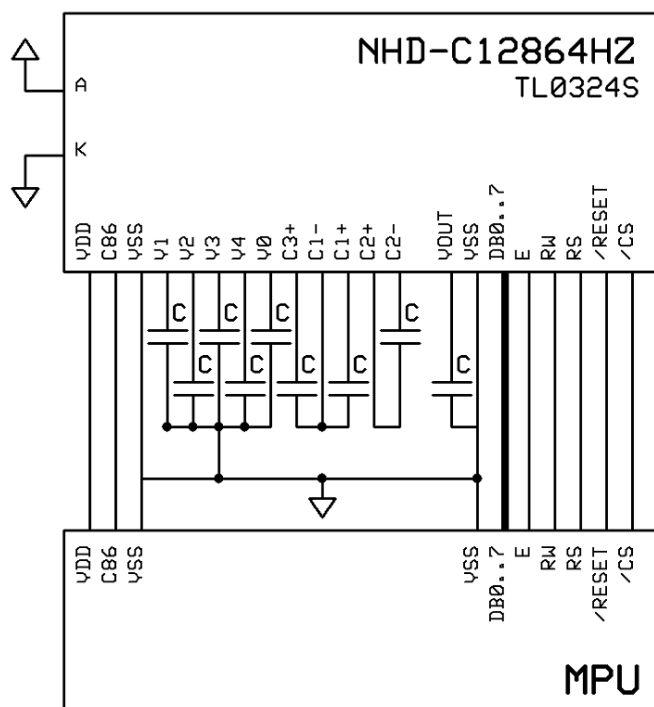


Pin Description and Wiring Diagram

Pin No.	Symbol	External Connection	Function Description
1	VDD	Power Supply	Power supply for logic (+3.0V)
2	C86	MPU	Select MPU interface pin. C86=H: 6800; C86=L: 8080
3	VSS	Power Supply	Ground
4	V0	Power Supply	1.0uF-2.2uF cap to VSS
5	V4	Power Supply	1.0uF-2.2uF cap to VSS
6	V3	Power Supply	1.0uF-2.2uF cap to VSS
7	V2	Power Supply	1.0uF-2.2uF cap to VSS
8	V1	Power Supply	1.0uF-2.2uF cap to VSS
9	C2-	Power Supply	Connect to 1uF cap to CAP2+ (PIN 10)
10	C2+	Power Supply	Connect to 1uF cap to CAP2- (PIN 9)
11	C1+	Power Supply	Connect to 1uF cap to CAP1-(PIN 12)
12	C1-	Power Supply	Connect to 1uF cap to CAP1+(PIN 11) and CAP3+(PIN 13)
13	C3+	Power Supply	Connect to 1uF cap to CAP1- (PIN 12)
14	Vout	Power Supply	Connect to 1uF cap to Vss
15	VSS	Power Supply	Ground
16-23	DB7-DB0	MPU	8 bi-directional three-state data bus lines.
24	E	MPU	Operation enable signal. Falling edge triggered.
25	RW	MPU	Read/write select signal. R/W=1: Read R/W=0: Write
26	RS	MPU	Register select signal. RS=0: Command, RS=1: Data
27	/RESET	MPU	Active LOW Reset signal
28	/CS	MPU	Active LOW chip select
A		Power Supply	Power supply for LED Backlight (+3.0V)
K		Power Supply	Ground for Backlight

Recommended LCD connector: 0.8mm pitch pins.

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	-30	-	+80	°C
Supply Voltage	VDD		2.9	3.0	-	V
Supply Current	IDD	Ta=25°C VDD=3.0V	-	0.42	0.62	mA
Supply for LCD (contrast)	VDD-V0	Ta=25°C	-	8.8	9.1	V
"H" Level input	Vih		0.2VDD	-	VDD	V
"L" Level input	Vil		Vss	-	0.2VDD	V
"H" Level output	Voh		0.2VDD	-	VDD	V
"L" Level output	Vol		Vss	-	0.2VDD	V

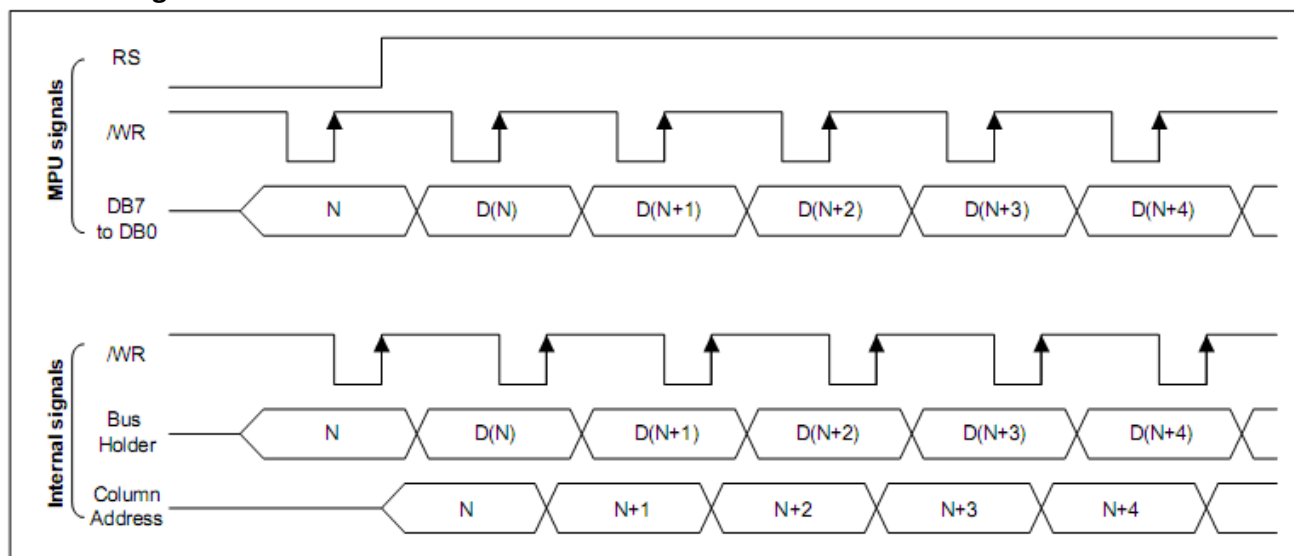
Optical Characteristics

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

Controller Information

Built-in TL0324S. Download specification at http://www.newhavendisplay.com/app_notes/TL0324S.pdf

Write Timing:



Read Timing:

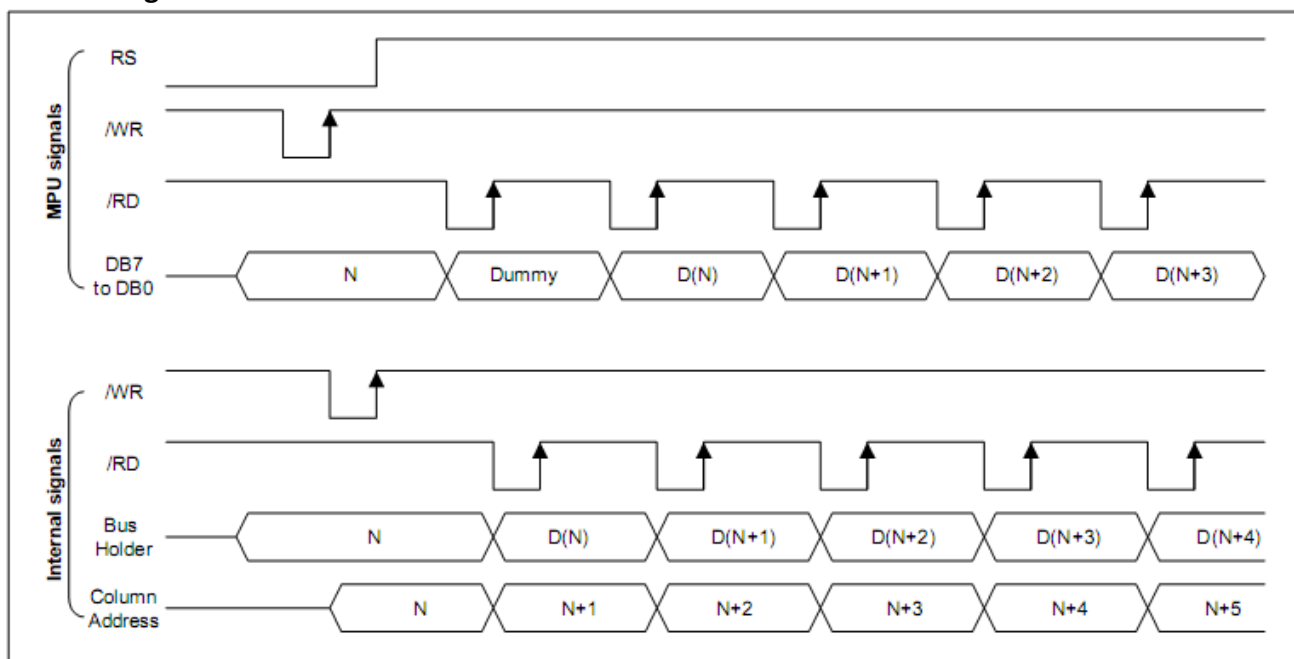


Table of Commands

Instruction	RS	RW	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0	Description
Read display data	1	1	Read data								Read data from DDRAM
Write display data	1	0	Write data								Write data into DDRAM
Read status	0	1	BUSY	ADC	ON / OFF	/RESET	0	0	0	0	Read the internal status
Display ON / OFF	0	0	1	0	1	0	1	1	1	DON	Turn ON / OFF LCD panel When DON = 0: display OFF When DON=1 : display ON
Initial display line	0	0	0	1	ST5	ST4	ST3	ST2	ST1	ST0	Specify DDRAM line for COM0
Set reference voltage mode	0	0	1	0	0	0	0	0	0	1	Set reference voltage mode
Set reference voltage register	0	0	X	X	SV5	SV4	SV3	SV2	SV1	SV0	Set reference voltage register
Set page address	0	0	1	0	1	1	P3	P2	P1	P0	Set page address
Set column address MSB	0	0	0	0	0	1	Y7	Y6	Y5	Y4	Set column address MSB
Set column address LSB	0	0	0	0	0	0	Y3	Y2	Y1	Y0	Set column address LSB
ADC select	0	0	1	0	1	0	0	0	0	ADC	Select SEG output direction. When ADC = 0 : normal direction (SEG0 ⇒ SEG131) When ADC = 1 ; reverse direction (SEG131 ⇒ SEG 0)
Reverse display ON / OFF	0	0	1	0	1	0	0	1	1	REV	Select normal / reverse display When REV = 0 : normal display When REV = 1 : reverse display
Entire display ON / OFF	0	0	1	0	1	0	0	1	0	EON	Select normal / entire display ON When EON = 0 : normal display When EON = 1 : entire display ON
LCD bias select	0	0	1	0	1	0	0	0	1	BIAS	Select LCD bias
Set modify-read	0	0	1	1	1	0	0	0	0	0	Set modify-read mode
Reset modify-read	0	0	1	1	1	0	1	1	1	0	Release modify-read mode
Reset	0	0	1	1	1	0	0	0	1	0	Initialize the internal function
SHL select	0	0	1	1	0	0	SHL	X	X	X	Select COM output direction When SHL = 0 : normal direction (COM0 ⇒ COM63) When SHL = 1 : reverse direction (COM63 ⇒ COM0)
Power control	0	0	0	0	1	0	1	VC	VR	VF	Control power circuit operation
Select Regulator Resistor	0	0	0	0	1	0	0	R2	R1	R0	Select internal resistance ratio of the regulator resistor
Set static indicator mode	0	0	1	0	1	0	1	1	0	SM	Set static indicator mode
Set static indicator register	0	0	X	X	X	X	X	X	S1	S0	Set static indicator register
Power save	-	-	-	-	-	-	-	-	-	-	Compound instruction of display OFF and entire display ON
NOP	0	0	1	1	1	0	0	0	1	1	<u>Non-Operation command</u>
Test Instruction_1	0	0	1	1	1	1	X	X	X	X	<u>Don't use this instruction</u>
Test Instruction_2	0	0	1	0	0	1	X	X	X	X	<u>Don't use this instruction</u>

Quality Information

Test Item	Content of Test	Test Condition	Note
High Temperature storage	Endurance test applying the high storage temperature for a long time.	+60°C , 48hrs	2
Low Temperature storage	Endurance test applying the low storage temperature for a long time.	-10°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