



**THE DATASHEET OF
NHD-C12864A1Z-FSW-FBW-HTT**



Product Specification

NHD- C12864A1Z-FSW-FBW-HTT

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

NHD-	Newhaven Display
C12864-	128 x 64 Pixels
A1Z-	Model
F-	Transflective
SW-	Side White LED Backlight
F-	FSTN (+)
B-	6:00 Optimal View
W-	Wide Temperature
HTT-	With 12V Heater (-40°C to +70°C)

Table of Contents

Document Revision History.....	2
Mechanical Drawing	3
Pin Description	4
Wiring Diagram	4
Electrical Characteristics	5
Optical Characteristics	5
Controller Information.....	5
Timing Characteristics.....	6
Table of Commands	7
Example Initialization Program	8
Quality Information	9

Additional Resources

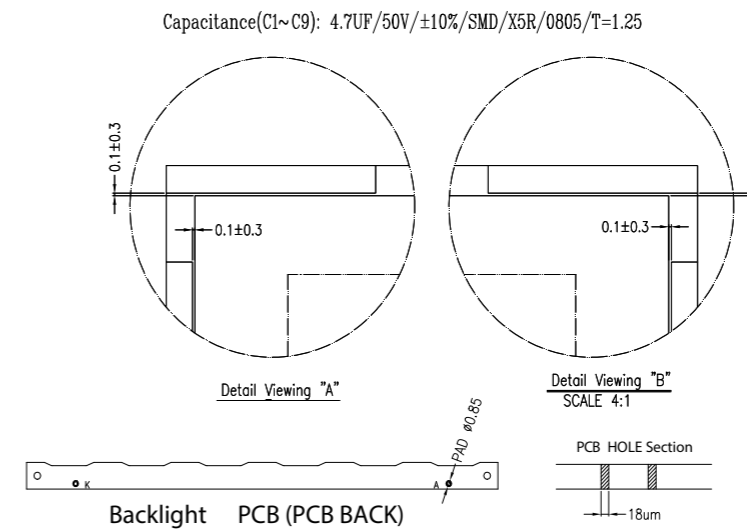
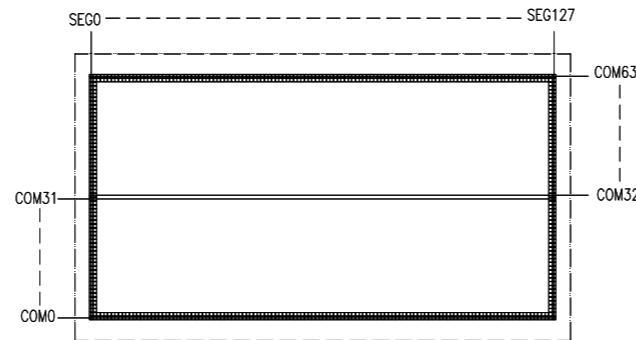
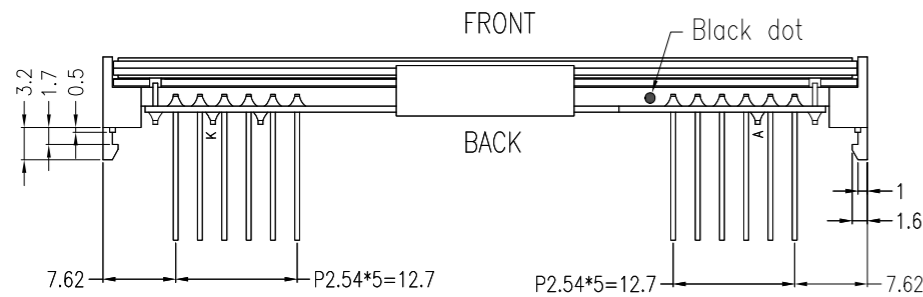
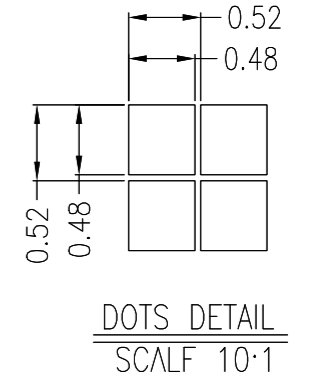
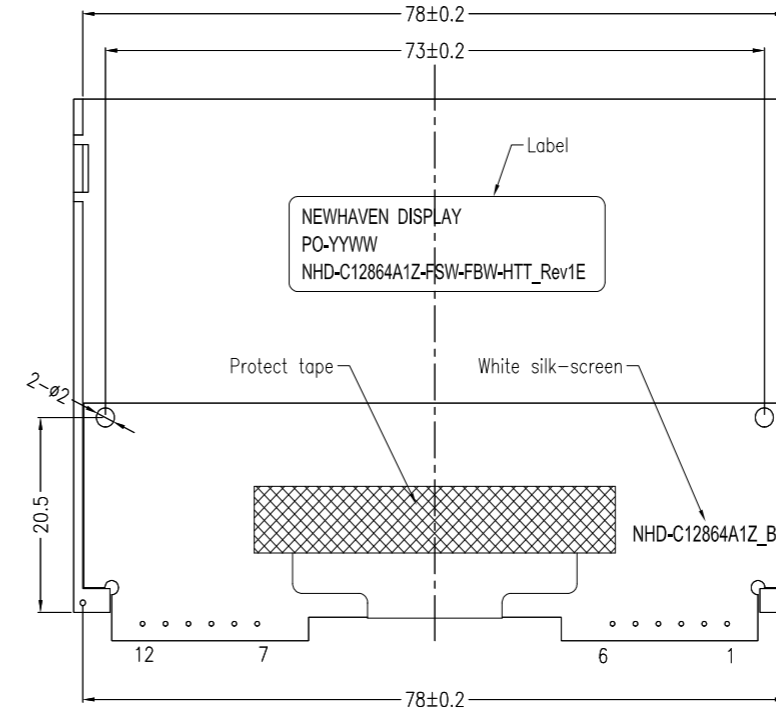
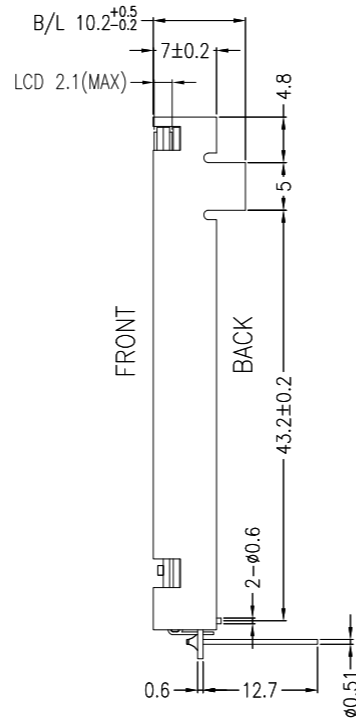
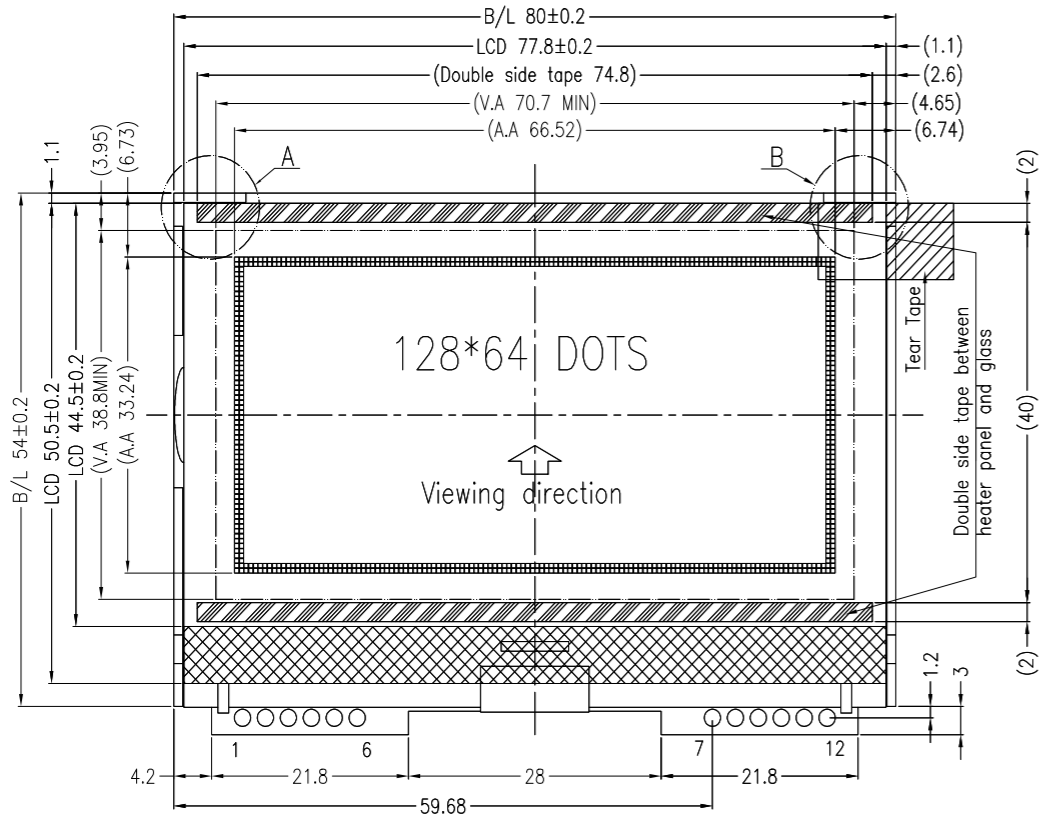
- **Support Forum:** <https://support.newhavendisplay.com/hc/en-us/community/topics>
- **GitHub:** <https://github.com/newhavendisplay>
- **Example Code:** <https://support.newhavendisplay.com/hc/en-us/categories/4409527834135-Example-Code/>
- **Knowledge Center:** https://www.newhavendisplay.com/knowledge_center.html
- **Quality Center:** https://www.newhavendisplay.com/quality_center.html
- **Precautions for using LCDs/LCMs:** <https://www.newhavendisplay.com/specs/precautions.pdf>
- **Warranty / Terms & Conditions:** <https://www.newhavendisplay.com/terms.html>



Document Revision History

Revision	Date	Description	Changed By
0	07/17/2008	Initial Release	-
1	09/28/2009	User Guide Reformat	BE
2	10/14/2009	Updated Electrical Characteristic	MC
3	11/20/2009	Updated Backlight Supply Current	MC
4	10/26/2010	Updated Backlight Current	BE
5	10/27/2010	Supply Current Updated	BE
6	08/31/2015	Electrical characteristics, Optical Characteristics, Mechanical Drawings Updated	SB
7	08/03/2016	Updated Electrical Characteristics and Quality Info	TM
8	09/23/2016	Updated Electrical Characteristics	TM
9	03/30/2017	Updated Electrical Characteristics	TM
10	12/20/2018	Updated Heater Resistance, Response time & Double-Sided Tape added to drawing	SB
11	03/21/2019	Heater Resistance Updated	SB
12	05/14/2019	Heater Resistance Modified, Backlight Current Updated	SB
13	05/23/2019	Heater Note Added	SB
14	06/04/2019	Added PCB Footprint Drawing	AS
15	01/24/2020	Heater Resistance, Backlight Design & Electrical Characteristics Updated	SB
16	07/16/2020	Updated Serial Interface Timing Characteristics	AS
17	10/09/2020	Updated LCD Contrast Range from 8.7V/9.0V/9.3V to 8.8V/9.0V/9.2V Part Revision Upgraded to Rev1D	AS
18	03/26/2021	Updated MIN Backlight Current & MAX Supply Voltage	AS
19	04/08/2021	Updated the Electrical, Optical Characteristics, Table of Commands, Quality Information and Mechanical Drawing	JT
20	04/20/2023	Date Code Format Updated on Mechanical Drawing	KL
21	01/05/2026	Updated Max VDD from 3.2V to 3.3V in Electrical Characteristics	KL

Mechanical Drawing



Capacitance(C1~C9): 4.7UF/50V/±10%/SMD/X5R/0805/T=1.25

Pin assignment	
NO.	Symbol
1	SCL
2	SI
3	VDD
4	A0
5	/RESET
6	/CS
7	VSS
8	H-
9	H+
10	LED-
11	LED+
12	NC

Product Description: 128x64 Graphic COG LCD

1. Driver IC: ST7565P
2. Driving Mode: 1/65 Duty, 1/9 Bias
3. Interface: SPI
4. Power Requirement: 3.0V
5. Optical Features: FSTN (+), Transflective, 6:00 View, White Backlight
6. Built in Heater

Standard Tolerance: (Unless otherwise specified) Linear: ±0.3mm		
	Drawing/Part Number: NHD-C12864A1Z-FSW-FBW-HTT	Revision: 1E
Unless otherwise specified: • Dimensions are in Millimeters • Third Angle Projection	Drawn By: K. Lewis Drawn Date: 04/20/2023	Approved By: K. Lewis Approved Date: 04/20/2023
This drawing is solely the property of Newhaven Display International, Inc. The information it contains is not to be disclosed, reproduced or copied in whole or part without written approval from Newhaven Display.		

Pin Description

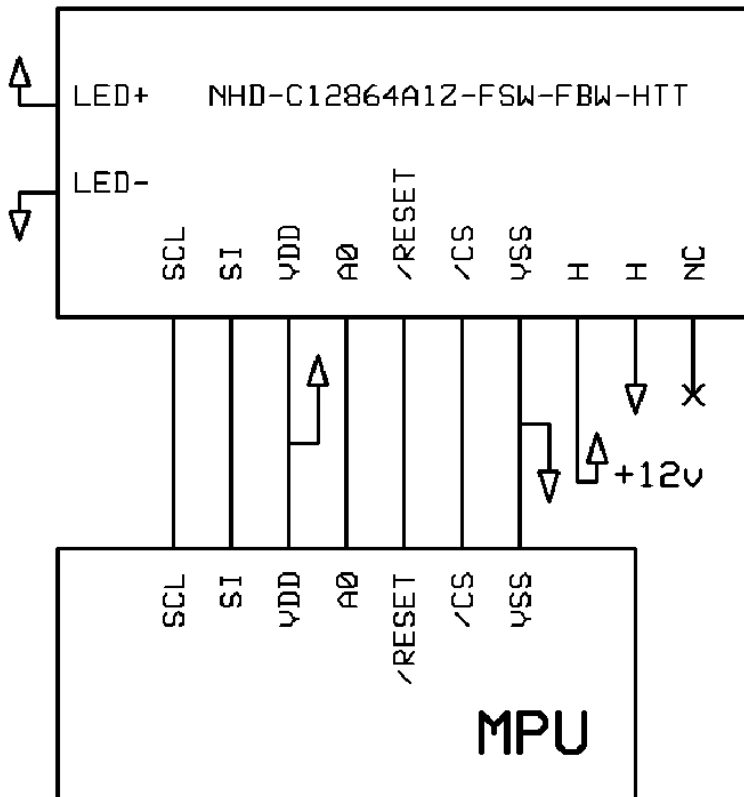
Pin No.	Symbol	External Connection	Function Description
1	SCL	MPU	Serial Clock input
2	SI	MPU	Serial Data input
3	V _{DD}	Power Supply	Supply Voltage for LCD and logic (+3.0V)
4	A0	MPU	Register Select. 0: instruction; 1: data
5	/RESET	MPU	Operation Active LOW Reset signal
6	/CS	MPU	Active LOW Chip Select Signal
7	V _{SS}	Power Supply	Ground
8	H	Power Supply	Heater Connection (+12V)
9	H	Power Supply	Heater Connection (GND)
10	LED-	Power Supply	Backlight Cathode (Ground)
11	LED+	Power Supply	Backlight Anode (+3.3V)
12	NC	-	No Connect

Recommended LCD connector: 2.54mm pitch thru-hole connection on PCB

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

Recommended Breakout Board: [NHD-PCB40](#)

Wiring Diagram



Electrical Characteristics

Item	Symbol	Condition	Min.	Typ.	Max.	Unit
Operating Temperature Range ¹	T _{OP}	V _H = 0V	-20	-	+70	°C
		V _H = 12.0V	-40	-	+70	°C
Storage Temperature Range	T _{ST}	-	-40	-	+80	°C
Supply Voltage	V _{DD}	-	2.8	3.0	3.3	V
Supply Current	I _{DD}	V _{DD} = 3.0V	0.1	0.2	1.0	mA
Supply for LCD (contrast)	V _{LCD}	T _{OP} = 25°C	8.8	9.0	9.2	V
"H" Level input	V _{IH}	-	0.8*V _{DD}	-	V _{DD}	V
"L" Level input	V _{IL}	-	0	-	0.2*V _{DD}	V
"H" Level output	V _{OH}	-	0.8*V _{DD}	-	V _{DD}	V
"L" Level output	V _{OL}	-	V _{SS}	-	0.2*V _{DD}	V
Backlight Supply Voltage	V _{LED}	-	3.2	3.3	3.4	V
Backlight Supply Current	I _{LED}	V _{LED} = 3.3V	20	50	60	mA
Heater Panel Resistance ²	R _{H+/-}	T = 25°C	5	20	35	Ω
Heater Voltage Supply	V _H	-	-	12	15	V

¹Heater **MUST** be activated when operating temperature drops below -20°C

²Heater measured using digital multi-meter

Optical Characteristics

Item	Symbol	Condition	Min.	Typ.	Max.	Unit
Optimal Viewing Angles	Top	CR ≥ 3	-	20	-	°
	Bottom		-	40	-	°
	Left		-	40	-	°
	Right		-	40	-	°
Contrast Ratio	CR	-	2	4	10	-
Response Time	Rise	T _{OP} = 25°C	-	135	240	ms
	Fall		-	235	325	ms
	Rise	T _{OP} = -40°C V _H = 12V	-	7.3	-	s
	Fall		-	6.7	-	s

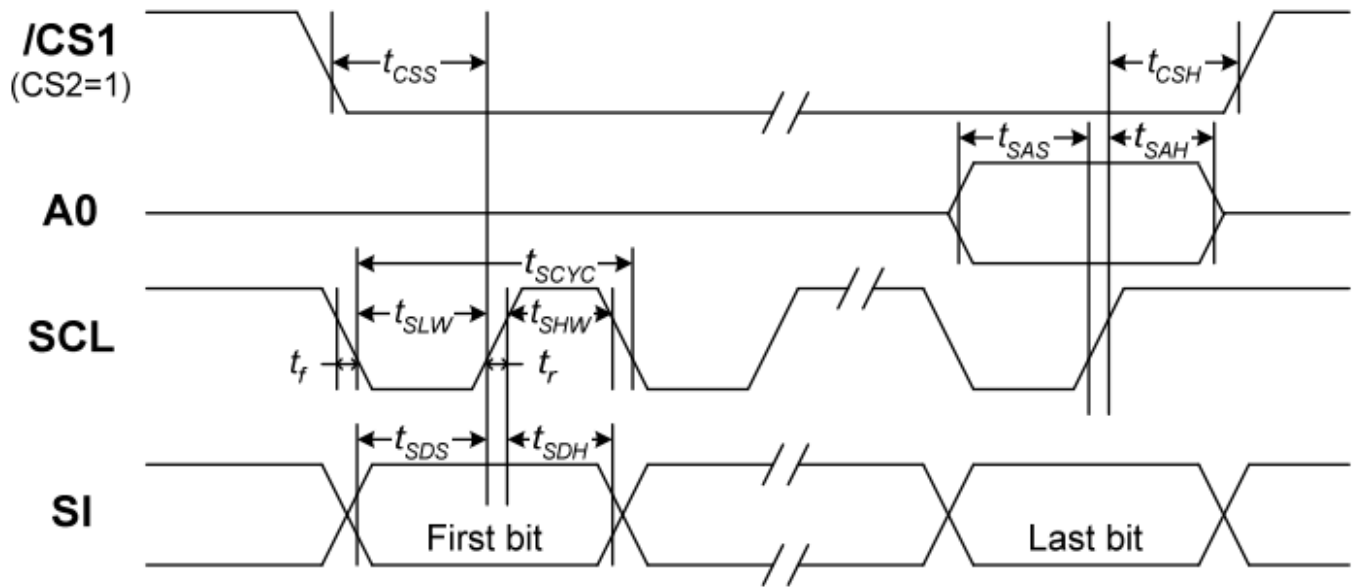
Controller Information

Built-in ST7565P Controller: <https://support.newhavendisplay.com/hc/en-us/articles/4414878951703-ST7565P>



Timing Characteristics

The Serial Interface



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	—	

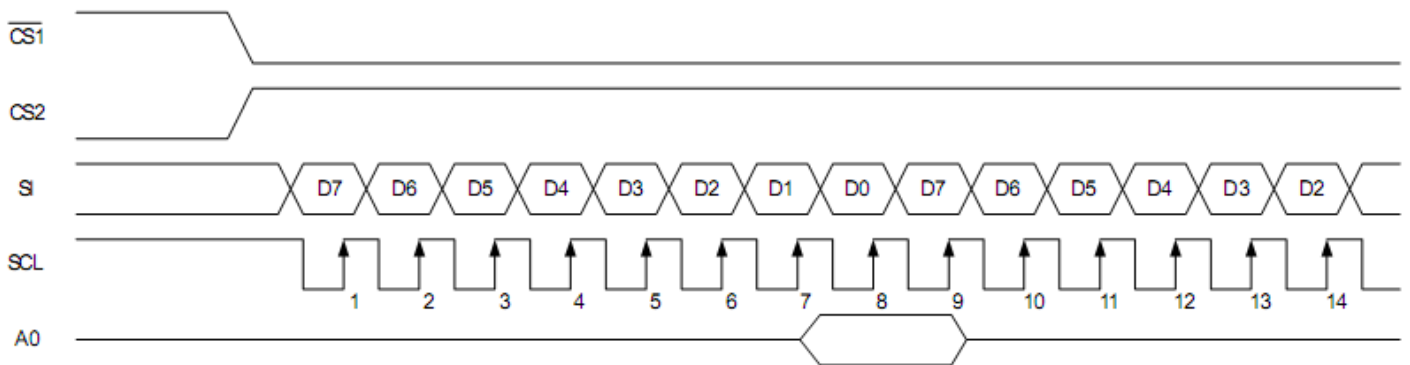


Table of Commands

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	1
(2) Display start line set	0	1	0	0	1	Display start address						
(3) Page address set	0	1	0	1	0	1	1	Page address				
(4) Column address set upper bit	0	1	0	0	0	0	1	Most significant column address				
Column address set lower bit	0	1	0	0	0	0	0	Least significant column address				
(5) Status read	0	0	1	Status				0	0	0	0	
(6) Display data write	1	1	0	Write data								
(7) Display data read	1	0	1	Read data								
(8) ADC select	0	1	0	1	0	1	0	0	0	0	0	1
(9) Display normal/reverse	0	1	0	1	0	1	0	0	1	1	0	1
(10) Display all points ON/OFF	0	1	0	1	0	1	0	0	1	0	0	1
(11) LCD bias set	0	1	0	1	0	1	0	0	0	1	0	1
(12) Read/modify/write	0	1	0	1	1	1	0	0	0	0	0	0
(13) End	0	1	0	1	1	1	0	1	1	1	0	
(14) Reset	0	1	0	1	1	1	0	0	0	1	0	
(15) Common output mode select	0	1	0	1	1	0	0	0	*	*	*	1
(16) Power control set	0	1	0	0	0	1	0	1	Operating mode			
(17) V ₀ voltage regulator internal resistor ratio set	0	1	0	0	0	1	0	0	Resistor ratio			
(18) Electronic volume mode set	0	1	0	1	0	0	0	0	0	0	0	1
Electronic volume register set	0	1	0	0	0	Electronic volume value						
(20) Booster ratio set	0	1	0	1	1	1	1	1	0	0	0	0
				0	0	0	0	0	0	0	step-up value	
(21) Power saver												
(22) NOP	0	1	0	1	1	1	0	0	0	1	1	
(23) Test	0	1	0	1	1	1	1	*	*	*	*	

Example Initialization Program

```
.....  
Sub Command  
Reset P3.7  
Reset P3.4  
For Writecount = 1 To 8  
Rotate A , Left , 1  
Reset P3.1  
P1 = A  
Set P3.1  
Next Writecount  
Set P3.7  
End Sub  
.....  
Sub Write  
Reset P3.7  
Set P3.4  
For Writecount = 1 To 8  
Rotate A , Left , 1  
Reset P3.1  
P1 = A  
Set P3.1  
Next Writecount  
Set P3.7  
End Sub  
.....  
Sub Init  
Waitms 100  
A = &HA0  
Call Command  
A = &HAE  
Call Command  
A = &HC0  
Call Command  
A = &HA2  
Call Command  
A = &H2F  
Call Command  
A = &H26  
Call Command  
A = &H81  
Call Command  
A = &H11  
Call Command  
A = &HAF  
Call Command  
End Sub  
.....
```

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 , 96hrs	2
Low Temperature storage	Endurance test applying the low storage temperature for a long time.	-40°C , 96hrs	1,2
High Temperature Operation	Endurance test applying the electric stress (voltage & current) and the high thermal stress for a long time.	+70°C , 96hrs	2
Low Temperature Operation	Endurance test applying the electric stress (voltage & current) and the low thermal stress for a long time.	-40°C /-20°C, 96hrs	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.	+50°C , 90% RH , 96hrs	1,2
Thermal Shock resistance	Endurance test applying the electric stress (voltage & current) during a cycle of low and high thermal stress.	-40°C /-20°C , 60min --> 70°C , 60min = 1 cycle For 20 cycles	
Vibration test	Endurance test applying vibration to simulate transportation and use.	10-50Hz , Acceleration of Gravity:5G 30 min in each of 3 directions X,Y,Z	3
Static electricity test	Endurance test applying electric static discharge.	Air: ±8kV 150pF/330Ω, 5 Times	
		Contact: ±4kV 150pF/330Ω, 5 Times	

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.



Looking for pricing, stock, or lifecycle information?

Click below to explore more details on WIN SOURCE:

-  [View NHD-C12864A1Z-FSW-FBW-HTT on WIN SOURCE](#)
-  [Newhaven Information](#)

Optimize Your Supply Chain with WIN SOURCE Solutions

-  Global Sourcing Solution
-  Obsolete Management
-  Cost Control Management
-  Shortage Management
-  Alternative Solution
-  Excess Inventory Management