

Product Specification

NHD-C24064WO-ATFH#-3V3

Chip-On-Glass Liquid Crystal Display Module

NHD -	Newhaven Display
C24064 -	240 x 64 Pixels
WO -	Model
A -	Transflective
T -	White LED Backlight
F -	FSTN (+)
H -	6:00 Optimal View, Wide Temperature
3V3 -	3.3V LCD, 3.5V Backlight

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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>

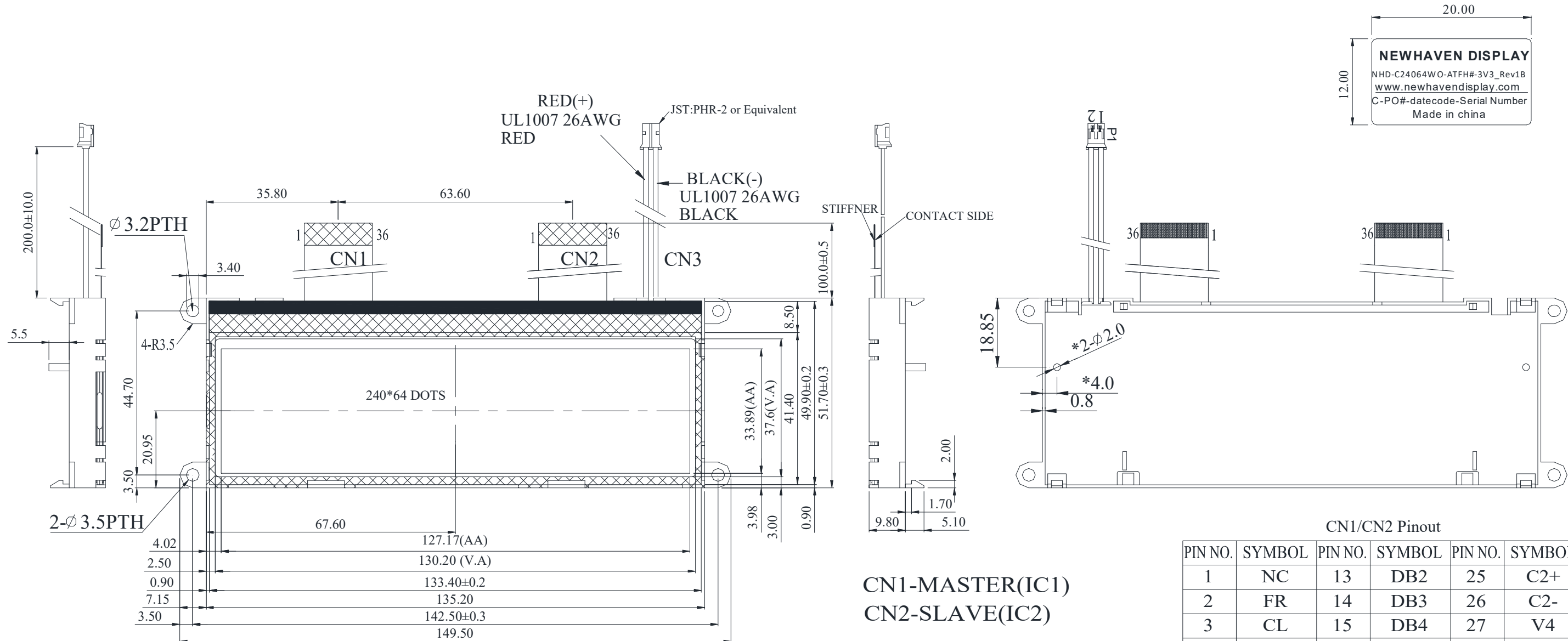


Document Revision History

Revision	Date	Description	Changed By
0	05/10/2007	Initial Release	-
1	09/23/2009	User guide reformat	BE
2	10/08/2009	Updated Backlight Information	MC
3	11/20/2009	Updated backlight supply current typ.	MC
4	08/26/2011	Mechanical Drawing Updated	TJ
5	02/03/2012	Controller link updated	AK
6	11/16/2012	Electrical characteristics & Wiring diagram updated	AK
7	04/04/2013	Backlight mating connector updated	AK
8	02/25/2014	Serial interface timing added	AK
10	12/21/2016	Electrical Characteristics Updated	SB
11	02/17/2017	Backlight Characteristics Updated	SB
12	12/08/2020	Part Revision Upgraded to Rev1A	AS
13	02/18/2022	P/N updated to Rev1B, IC changed to ST7565P	ZP
14	05/11/2022	Updated Pin Description	CJ
15	06/16/2022	Updated Mechanical Drawing, Optical Characteristics	CJ
16	07/14/2022	Updated backlight voltage and current conditions	CJ
17	08/02/2022	Updated Mechanical Drawing	CJ

Mechanical Drawing

SYMBOL	REVISION	DATE



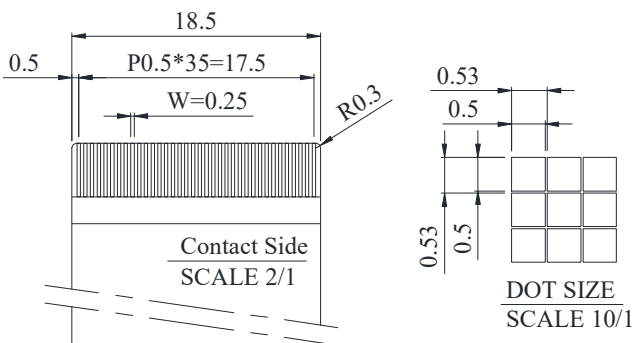
NEWHAVEN DISPLAY
NHD-C24064WO-ATFH#-3V3_Rev1B
www.newhavendisplay.com
C-PO#-datecode-Serial Number
Made in china

CN1-MASTER(IC1)
CN2-SLAVE(IC2)

CN1/CN2 Pinout					
PIN NO.	SYMBOL	PIN NO.	SYMBOL	PIN NO.	SYMBOL
1	NC	13	DB2	25	C2+
2	FR	14	DB3	26	C2-
3	CL	15	DB4	27	V4
4	/DOF	16	DB5	28	V3
5	/CS1	17	DB6	29	V2
6	CS2	18	DB7	30	V1
7	/RES	19	VDD	31	V0
8	A0	20	VSS	32	VR
9	/WR	21	VOUT	33	C86
10	/RD	22	C3+	34	P/S
11	DB0	23	C1-	35	NC
12	DB1	24	C1+	36	NC

CN3 Pinout	
PIN NO.	SYMBOL
1	ANODE
2	CATHODE

- Product Description: 240x64 Graphic COG LCD
- LCD Driver IC: ST7565P
 - LCD Interface: Serial, 8-bit Parallel 6800/8080
 - LCD Power Requirement: 3.3V, Backlight: 112mA (3.5V Reference)
 - Optical Features: FSTN (+), Transflective, 6:00 Optimal View
 - LCD Mating Connector: 36pin, 0.5mm pitch
 - Backlight Mating Connector: A2001WR-2P



Standard Tolerance:
(Unless otherwise specified)

Linear: ±0.3mm

Unless otherwise specified:

- Dimensions are in Millimeters
- Third Angle Projection

NEWHAVEN DISPLAY INTERNATIONAL

Drawing/Part Number: NHD-C24064WO-ATFH#-3V3

Revision: 1B

Size: A3

Scale: NS

Do Not Scale Drawing

Sheet 1 of 1

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Pin Description

Pin No.	Symbol	External Connection	Function Description
1	NC	-	No Connect
2	FR	-	Alternating current signal (tie both FR pins together)
3	CL	-	Clock input terminal (tie both CL pins together)
4	/DOF	-	Blanking control output (tie both /DOF pins together)
5	/CS1	MPU	Active LOW Chip Select Signal
6	CS2	MPU	Active HIGH Chip Select Signal (can tie HIGH)
7	/RES	MPU	Active LOW Reset signal
8	A0	MPU	Register Select. 0: Instruction; 1: Data
9	/WR R/W	MPU	In 8080 mode: Active LOW Write signal In 6800 mode: R/W=1 for Read; R/W=0 for Write
10	/RD E	MPU	In 8080 mode: Active LOW Read signal In 6800 mode: Enable signal; Falling edge triggered
11	DB0	MPU	Parallel Interface DB0-DB7: Bi-directional 8-bit data bus Serial Interface: DB0-DB5: No connect in serial mode DB6 = Serial clock DB7 = Serial data input
12	DB1		
13	DB2		
14	DB3		
15	DB4		
16	DB5		
17	DB6 (SCL)		
18	DB7 (SI)		
19	V _{DD}	Power Supply	Supply Voltage for Logic (3.3V)
20	V _{SS}	Power Supply	Ground
21	V _{OUT}	Power Supply	1.0uF Cap to Ground
22	C3+	Power Supply	1.0uF-2.2uF cap to C1- (Pin-23)
23	C1-	Power Supply	1.0uF-2.2uF cap to C3+ (Pin-22) and C1+ (Pin-24)
24	C1+	Power Supply	1.0uF-2.2uF cap to C1- (Pin-23)
25	C2+	Power Supply	1.0uF-2.2uF cap to C2- (Pin-26)
26	C2-	Power Supply	1.0uF-2.2uF cap to C2+ (Pin-25)
27	V4	Power Supply	1.0uF-2.2uF cap to VDD
28	V3	Power Supply	1.0uF-2.2uF cap to VDD
29	V2	Power Supply	1.0uF-2.2uF cap to VDD
30	V1	Power Supply	1.0uF-2.2uF cap to VDD
31	V0	Power Supply	1.0uF-2.2uF cap to VDD
32	VR	-	No connection
33	C86	MPU	Select MPU interface pin. C86 = H: 6800; C86 = L: 8080
34	P/S	MPU	Parallel/Serial select. PS = H: Parallel; PS = L: Serial
35	NC	-	No connection
36	NC	-	No connection

Recommended LCD connectors: 0.5mm pitch pins. Molex p/n: 54132-3697

Backlight connector: A2001H-02P

Mates with: A2001WR-2P, A2001WR-S-2P, A2001WV-2P, A2001WV-S-2P



Electrical Characteristics

Item	Symbol	Condition	Min.	Typ.	Max.	Unit
Operating Temperature Range	T _{OP}	Absolute Max	-20	-	+70	°C
Storage Temperature Range	T _{ST}	Absolute Max	-30	-	+80	°C
Supply Voltage	V _{DD}	-	3.0	3.3	3.6	V
Supply Current	I _{DD}	V _{DD} = 3.3V	-	1.5	2.5	mA
Supply for LCD (contrast)	V _{LCD}	T _{OP} = 25°C	10.7	11	11.3	V
"H" Level input	V _{IH}	-	0.8 * V _{DD}	-	V _{DD}	V
"L" Level input	V _{IL}	-	V _{SS}	-	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}	-	3.4	3.5	3.6	V
Backlight Supply current	I _{LED}	V _{LED} = 3.5V	35	112	140	mA

Optical Characteristics

Item		Symbol	Condition	Min.	Typ.	Max.	Unit
Optimal Viewing Angles	Top	φY+	CR ≥ 2	-	30	-	°
	Bottom	φY-		-	60	-	°
	Left	θX-		-	45	-	°
	Right	θX+		-	45	-	°
Contrast Ratio		CR	-	-	5	-	-
Response Time	Rise	T _R	T _{OP} = 25°C	-	200	300	ms
	Fall	T _F		-	250	350	ms

Controller Information

Built-in ST7565P controller.

Please download specification at <https://support.newhavendisplay.com/hc/en-us/articles/4414878951703-ST7565P>

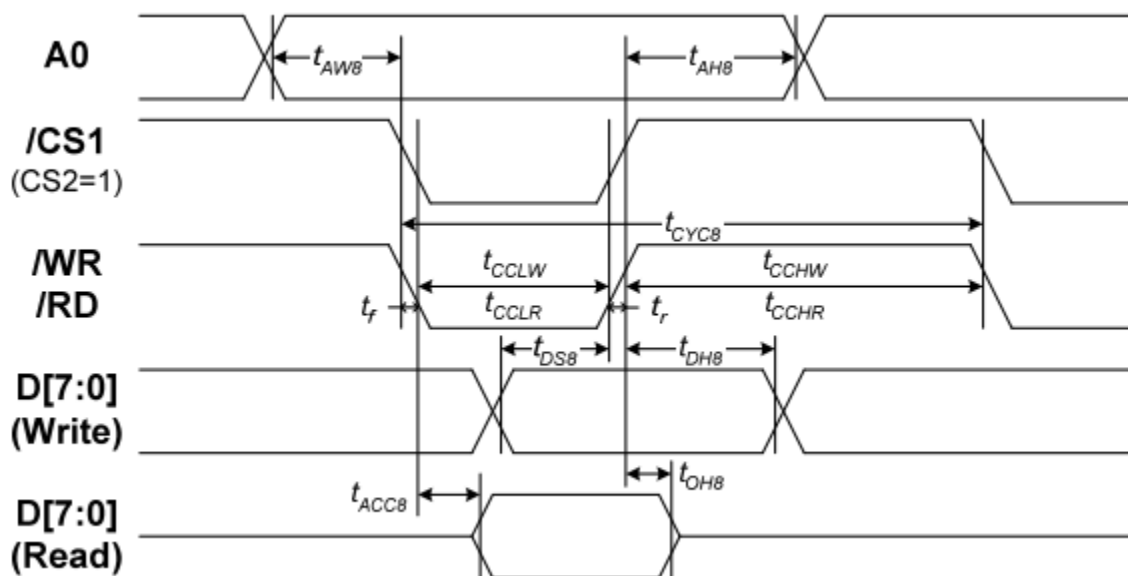


Table of Commands

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	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 ₀ voltage regulator internal resistor ratio set	0	1	0	0	0	1	0	0	Resistor ratio			Select internal resistor ratio(Rb/Ra) mode	
(18) Electronic volume mode set	0	1	0	1	0	0	0	0	0	0	1	Set the V ₀ output voltage electronic volume register	
Electronic volume register set				0	0	Electronic volume value							
(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	

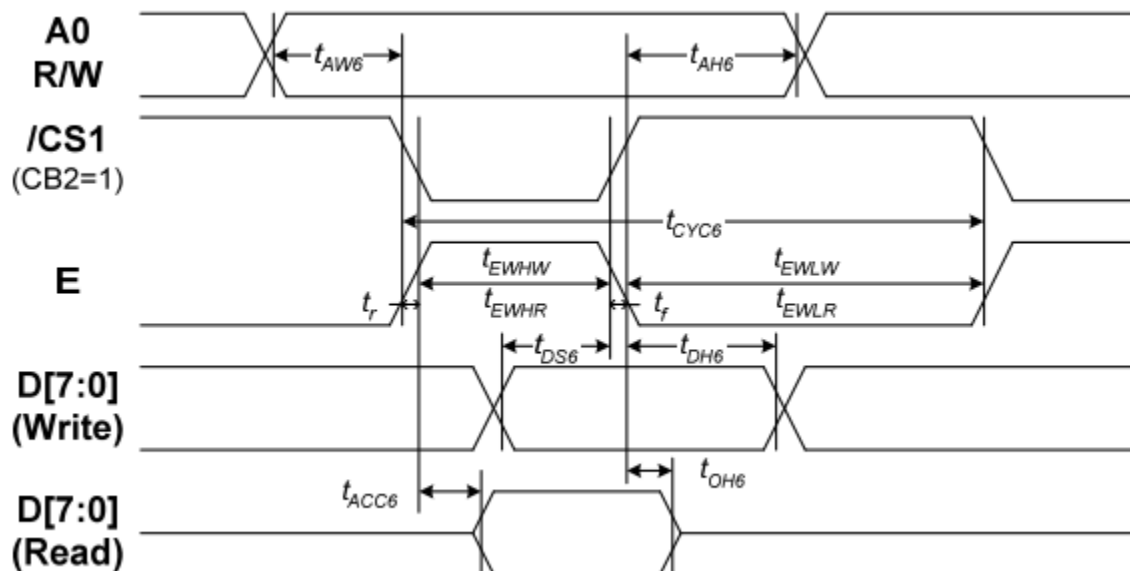
Timing Characteristics

8080 Series MPU



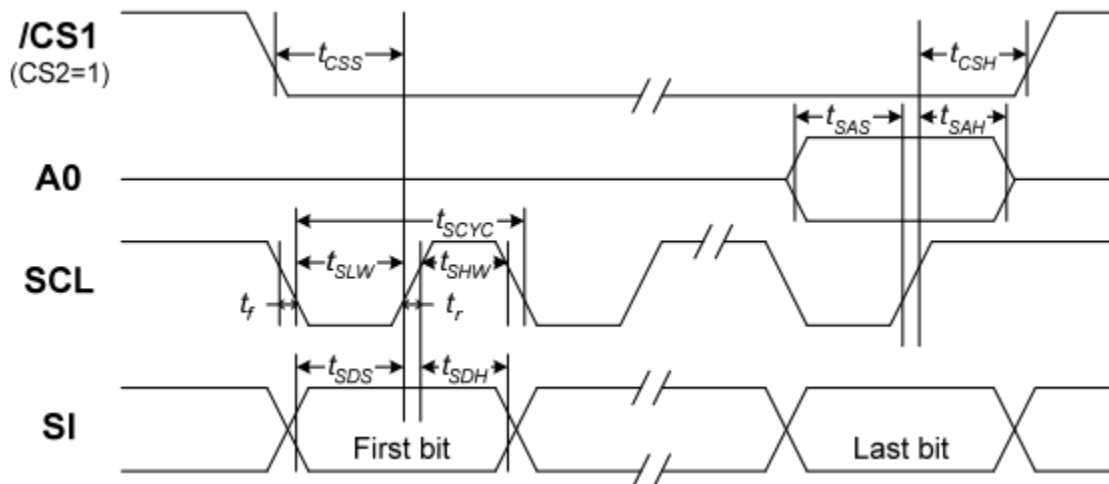
Item	Signal	Symbol	Condition	Rating		Units
				Min.	Max.	
Address hold time	A0	t_{AH8}		0	—	Ns
Address setup time		t_{AW8}		0	—	
System cycle time		t_{CYC8}		240	—	
Write L pulse width	/WR	t_{CCLW}		80	—	
Write H pulse width		t_{CCHW}		80	—	
Read L pulse width	/RD	t_{CCLR}		140	—	
Read H pulse width		t_{CCHR}		80	—	
Write Data setup time	D0 to D7	t_{DS8}		40	—	
Write Address hold time		t_{DH8}		0	—	
Read access time		t_{ACC8}	$C_L = 100 \text{ pF}$	—	70	
Read Output disable time		t_{OH8}	$C_L = 100 \text{ pF}$	5	50	

6800 Series MPU



Item	Signal	Symbol	Condition	Rating		Units
				Min.	Max.	
Address hold time	A0	t_{AH6}		0	—	ns
Address setup time		t_{AW6}		0	—	
System cycle time		t_{CYC6}		240	—	
Enable L pulse width (WRITE)	E	t_{EHLW}		80	—	
Enable H pulse width (WRITE)		t_{EHLR}		80	—	
Enable L pulse width (READ)		t_{EHLW}		80	—	
Enable H pulse width (READ)		t_{EHLR}		140	—	
WRITE Data setup time	D0 to D7	t_{DS6}		40	—	
WRITE Address hold time		t_{DH6}		0	—	
READ access time		t_{ACC6}	$C_L = 100 \text{ pF}$	—	70	
READ Output disable time		t_{OH6}	$C_L = 100 \text{ pF}$	5	50	

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	—	

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 , 200hrs	2
Low Temperature storage	Endurance test applying the low storage temperature for a long time.	-30°C , 200hrs	1,2
High Temperature Operation	Endurance test applying the electric stress (voltage & current) and the high thermal stress for a long time.	+70°C , 200hrs	2
Low Temperature Operation	Endurance test applying the electric stress (voltage & current) and the low thermal stress for a long time.	-20°C , 200hrs	1,2
High Temperature / Humidity Storage	Endurance test applying the electric stress (voltage & current) and the high thermal with high humidity stress for a long time.	+60°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.	-20°C ← 25°C → 70°C 30min ← 5min → 30min = 1 cycle For 10 cycles	
Vibration test	Endurance test applying vibration to simulate transportation and use.	10-55Hz, 1.5mm amplitude. 60 sec in each of 3 directions X,Y,Z For 15 minutes	3
Static electricity test	Endurance test applying electric static discharge.	Air: ±800V 150pF/330Ω, 5 Times	
		Contact: ±600V 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.