HOTDISPLAY

Specification of LCD Module

Product No:

H T M 320240AW5706

Standard code	Department	Rev No.
Checked by	Written by	Date

RECORDS OF REVISION

VERSION	DATE	REVISED PAGE NO.	SUMMARY
A	2025/3/03		First issue

Contents

1.General Specification

ITEM	STANDARD VALUE	UNIT
Number of dots	320x240	dots
Outline dimension	160.0(W)x 109.0(H)x 13.0max(T)	mm
View area	122.0(W)x 92.0(H)	mm
Active area	115.18(W)x 86.38(H)	mm
Dot size	0.34(W)x 0.34(H)	mm
Dot pitch	0.36(W)x 0.36(H)	mm
LCD type	FSTN Positive, Transflective , (In LCD production, It will occur slightly color difference. We can only guarantee the same color in the same batch.)	
View direction	6 o'clock	
Backlight	LED , White	

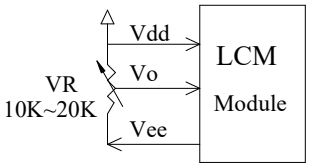
2.Absolute Maximum Ratings

ITEM	SYMBOL	MIN.	TYP.	MAX.	UNIT
Operating Temperature	T_{OP}	-20	—	+70	℃
Storage Temperature	T_{ST}	-30	—	+80	℃
Input Voltage	V_I	0	—	V_{DD}	V
Supply Voltage For Logic	V_{DD}	0	—	6.5	V
Supply Voltage For LCD	V_{DD}-V_{EE}	0	—	32	V

3.Electrical Characteristics

ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT
Logic Voltage	V_{DD}-V_{SS}	—	2.7		5.5	V
Supply Voltage For LCD *Note	V_{DD}-V_O	Ta=-20℃	—	—	23.2	V
		Ta=25℃	—	22.0	—	V
		Ta=+70℃	211	—	—	V
Input High Volt.	V_{IH}	—	0.8VDD	—	VDD	V
Input Low Volt.	V_{IL}	—	-0.3	—	0.2VDD	V
Output High Volt.	V_{OH}	—	VDD -0.4	—	VDD	V
Output Low Volt.	V_{OL}	—	0	—	0.4	V
Supply Current	I_{DD}	—	12.5	15.0	18.0	mA

*Note: Please design the VOP adjustment circuit on customer's main board



4. Backlight Information

Specification

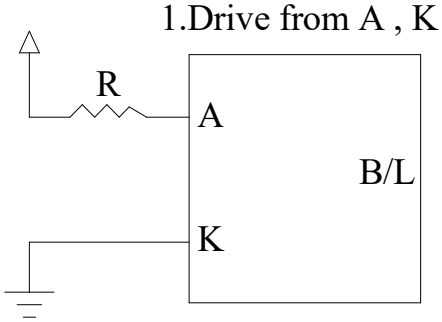
PARAMETER	SYMBOL	MIN	TYP	MAX	UNIT	TEST CONDITION
Supply Current	ILED	—	128	—	mA	V=3.5V
Supply Voltage	V	—	3.5	—	V	—
Reverse Voltage	VR	—	—	10	V	—
Luminous Intensity	IV	340	450	—	CD/M^2	ILED=128
Wave Length	λp	—		—	nm	ILED=128
LED Life Time	—	—	50K	—	Hr.	ILED≦128
Color	White					

Note: The LED of B/L is drive by current only, drive voltage is for reference only. drive voltage can make driving current under safety area (current between minimum and maximum).

Note1 :50K hours is only an estimate for reference.

LED B\L Drive Method

1.Drive from A , K

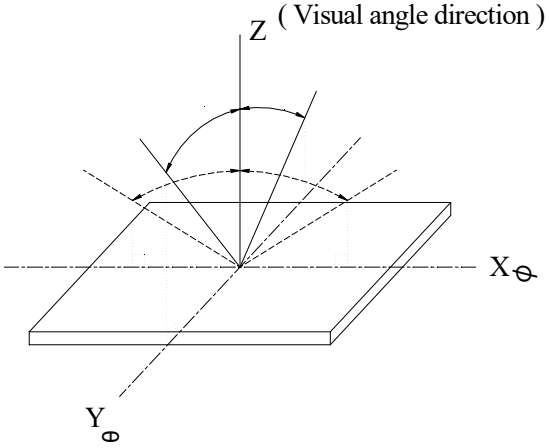


5.Optical Characteristics

ITEM	SYMBAL	CONDITION	MIN	TYP	MAX	UNIT
View Angle	(V) θ	CR≧2	30	—	60	deg.
	(H) φ	CR≧2	-45	—	45	deg.
Contrast Ratio	CR	—	—	3	—	—
Response Time	T rise	—	—	150	200	ms
	T fall	—	—	150	200	ms

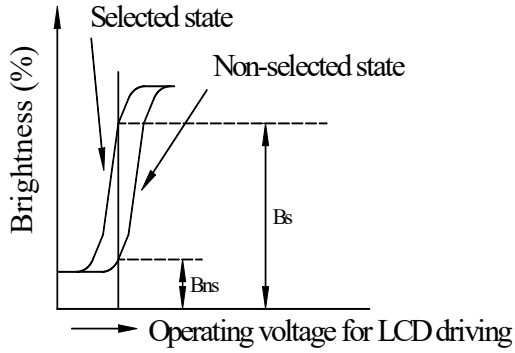
5.1 Definitions

■View Angles

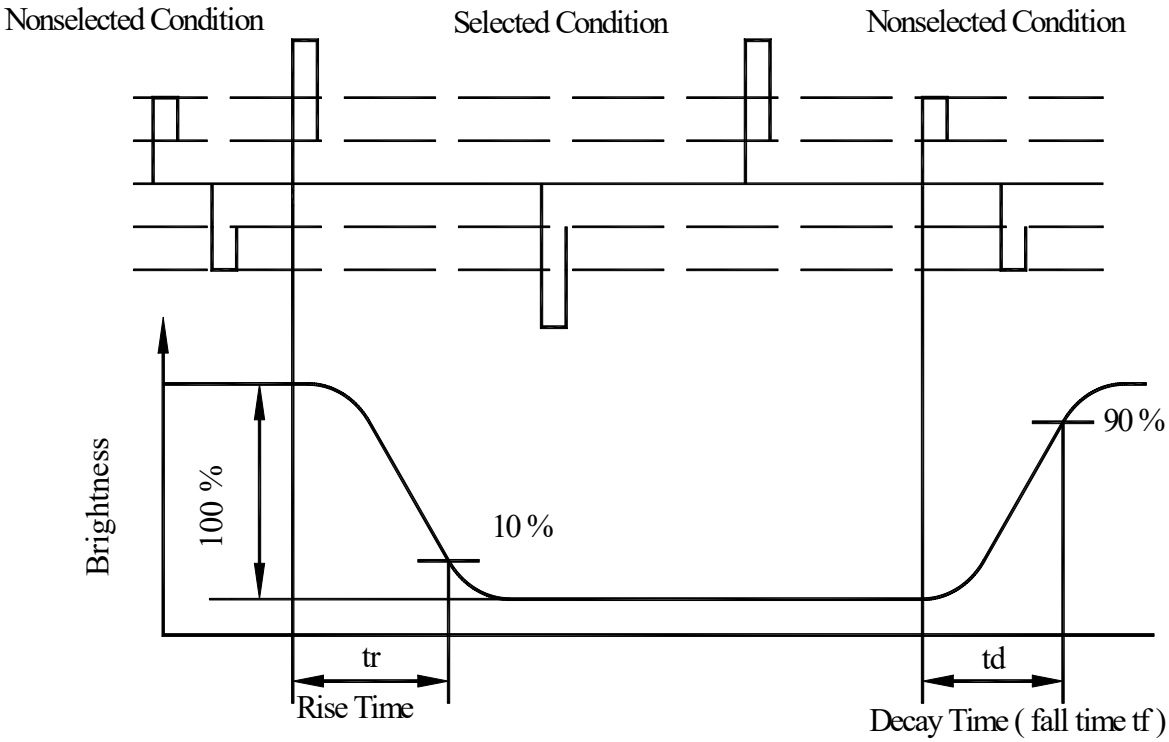


■Contrast Ratio

$$CR = \frac{\text{Brightness at selected state (BS)}}{\text{Brightness at non-selected state (Bns)}}$$



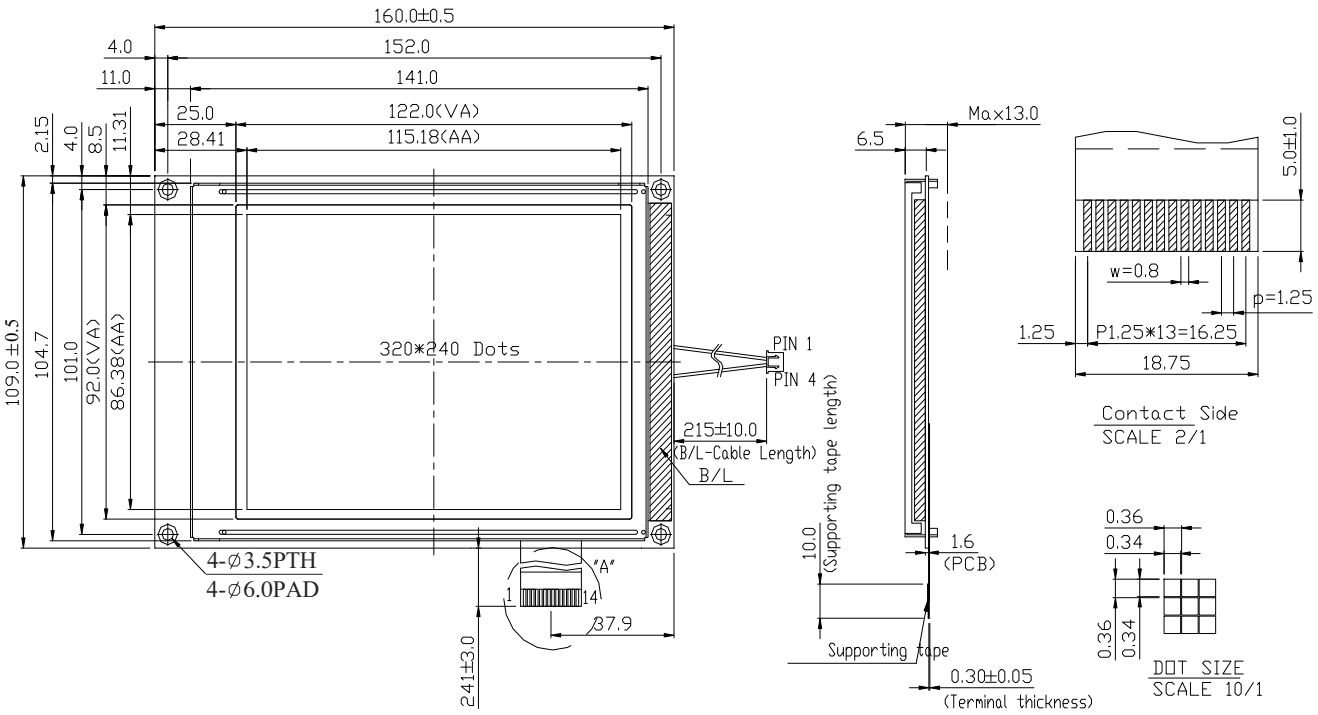
■Response time

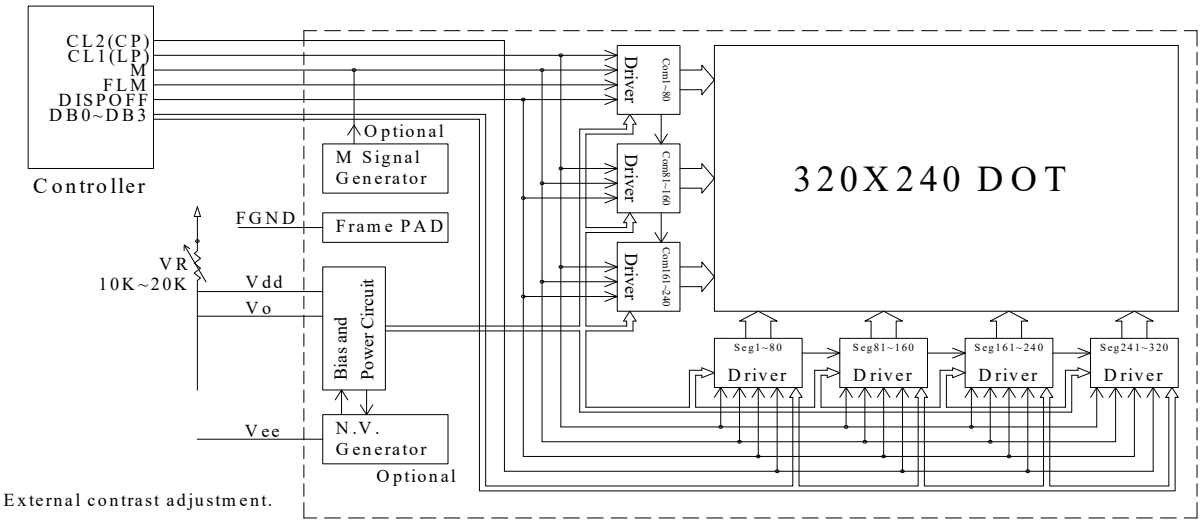


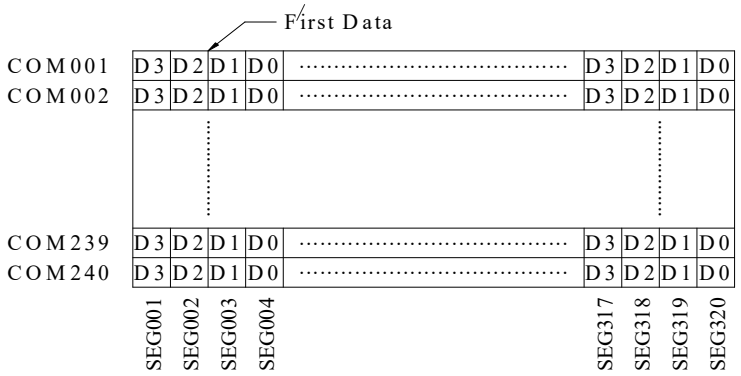
6.Interface Description

Pin No.	Symbol	Level	Description
14	DB0	H/L	Data bus line
13	DB1	H/L	Data bus line
12	DB2	H/L	Data bus line
11	DB3	H/L	Data bus line
10	DISPOFF	H/L	H: Display ON, L: Display OFF
9	FLM	H/L	Scan start-up signal
8	NC	-	NC
7	LP	H to L	Data latch pulse
6	CP	H to L	Data shift pulse
5	V_{DD}		Power supply for Logic
4	V_{SS}	0V	Ground
3	V_{EE}		NC
2	V_O	(Variable)	Driving voltage for LCD
1	FGND		Frame Ground

7.Contour Drawing & Block diagram







8.Timing Characteristics

ELECTRICAL CHARACTERISTICS

DC CHARACTERISTICS

(1) Segment Driver Application

(V_{SS} = 0V, Ta = - 30 ~ +85°C)

Characteristic	Symbol	Test Condition		Min.	Typ.	Max.	Unit
Operating Voltage 1	V_{DD}	-		2.7	-	5.5	V
	V_{LCD}	V_{IN}=V_{DD}-V_{EE}		6	-	28	
Input voltage (1)	V_{IH}	-		0.8V_{DD}	-	V_{DD}	
	V_{IL}	-		0	-	0.2V_{DD}	
Input voltage (2)	V_{OH}	I_{OH}=-0.4mA		V_{DD}-0.4	-	-	V
	V_{OL}	I_{OH}=-0.4mA		-	-	0.4	
Input leakage current 1 (1)	I_{IL1}	V_{IN}=V_{DD} to V_{SS}		-10	-	10	μA
Input leakage current 2 (3)	I_{IL2}	V_{IN}=V_{DD} to V_{EE}		-25	-	25	
On resistance(4)	R_{ON}	I_{ON}=100 μA		-	2	4	kΩ
Supply current(5)	I_{STBY}	f_{CL1}=32kHZ, M=VSS	V_{SS} PIN	-	-	100	μA
	I_{DD}	f_{CL1}=32kHZ F_M=80HZ	V_{DD}=5V	-	-	5	mA
			V_{DD}=3V	-	-	2	
	I_{EE}		V_{DD}=5V	-	-	500	μA

NOTES:

1. Applied to CL1, CL2, ELB, ERB, D1_SID - D4_DR, SHL, DISPOFFB, M, CS, AMS pin
2. ELB, ERB pin
3. V0, V12, V43, V5 pin
4. V_{LCD} = V_{DD} - V_{EE}, V0 = V_{DD} = 5V, V5= V_{EE} = -23 V
V12 = V_{DD}-2/n(V_{LCD}), V43 = V_{EE}+2/n(V_{LCD}), n = 17 (1/256 duty, 1/17 bias)
5. V0 = V_{DD}, V12 = 1.71V(V_{DD} = 5V) or -0.06V (V_{DD} = 3V),
V43 = -19.71 V(VDD = 5V) or -19.94V (V_{DD} = 3V), V5 = V_{EE} = -23V, no-load condition (1/256 duty, 1/17 bias)
4-bit parallel interface mode
I_{STBY} : V_{DD} = 5V, f_{CL2} = 5.12MHz, SHL = V_{SS}, DISPOFFB = V_{DD}, M = V_{SS}, display data pattern = 0000
I_{DD} : V_{DD} = 3V, f_{CL2} = 4MHz, display data pattern = 0101
V_{DD} = 5 V, f_{CL2} = 5.12MHz, display data pattern = 0101
I_{EE} : V_{DD} = 5V, f_{CL2} = 5.12MHz, display data pattern = 0101, V_{EE} pin

DC CHARACTERISTICS (CONTINUED)
(2) Common Driver Application

(V_{SS} = 0V, Ta = - 30 ~ +85°C)

Characteristic	Symbol	Test Condition		Min.	Typ.	Max.	Unit
Operating Voltage 1	V_{DD}	-		2.7	-	5.5	V
	V_{LCD}	V_{IN}=V_{DD}-V_{EE}		6	-	28	
Input voltage (1)	V_{IH}	-		0.8V_{DD}	-	V_{DD}	
	V_{IL}	-		0	-	0.2V_{DD}	
Input voltage (3)	V_{OH}	I_{OH}=-0.4mA		V_{DD}-0.4	-	-	V
	V_{OL}	I_{OH}=-0.4mA		-	-	0.4	
Input leakage current 1 (1)	I_{IL1}	V_{IN}=V_{DD} to V_{SS}		-10	-	10	μA
Input leakage current 2 (2)	I_{IL2}	V_{IN}=0V, V_{DD}=5V(Pull up)		-50	-125	-250	
Input leakage current 3 (4)	I_{IL3}	V_{IN}=V_{DD} to V_{EE}		-25	-	25	
On resistance(5)	R_{ON}	I_{ON}=100 μA		-	2	4	kΩ
Supply current(6)	I_{STBY}	f_{CL1}=32kHZ, M=VSS	V_{SS} PIN	-	-	100	μA
	I_{DD}	f_{CL1}=32kHZ F_M=80HZ	V_{DD}=5V	-	-	200	
			V_{DD}=3V	-	-	120	
	I_{EE}		V_{DD}=5V	-	-	150	

NOTES:

1. Applied to CL1, D2_DL (SHL = LOW), D4_DR (SHL = HIGH), SHL, DISPOFFB, M, CS, AMS pin
2. Pull-up input pins : CL2, D1_SID, D3_DM (AMS = HIGH), ELB (SHL = LOW), ERB (SHL = HIGH)
3. D2_DL (SHL = HIGH) , D4_DR (SHL = LOW) pin
4. V0, V12, V43, V5 pin
5. V_{LCD} = V_{DD}-V_{EE}, V0 = V_{DD} = 5V, V5 = V_{EE} = -23V
V12 = V_{DD}-1/n(V_{LCD}), V43 = V_{EE}+1/n(V_{LCD}), n = 17(1/256 duty, 1/17 bias)
6. V0 = V_{DD}, V12 = 3.35V (V_{DD} = 5V) or 1.47V (V_{DD} = 3V),
V43 = -21.35V (V_{DD} = 5 V) or -21.47V (V_{DD} = 3 V), V5 = V_{EE} = -23 V, no-load condition (1/256 duty, 1/17 bias)
single-type mode operation : AMS = V_{SS}, SHL = V_{SS}, DISPOFFB = V_{DD}
D1_SID = D3_DM = VDD, D4_DR = OPEN, ELB = ERB = OPEN,
I_{STBY} : V_{DD} = 5V, M = V_{SS}, D2_DL = V_{SS}
I_{DD} : f_M = 80Hz, D2_DL = V_{DD}
V_{DD} = 3 V, display data pattern = 10000000..., 01000000..., 00100000..., 00010000..., ..
V_{DD} = 5 V, display data pattern = 10000000..., 01000000..., 00100000..., 00010000..., ..
I_{EE} : f_M = 80Hz, D2_DL = V_{DD}
V_{DD} = 5V, current through V_{EE} Pin, display data pattern = 10000000..., 01000000...,
00100000..., 00010000...

AC CHARACTERISTICS

(1) Segment Driver Application

(V_{SS} = 0V, Ta = - 30 ~ +85°C)

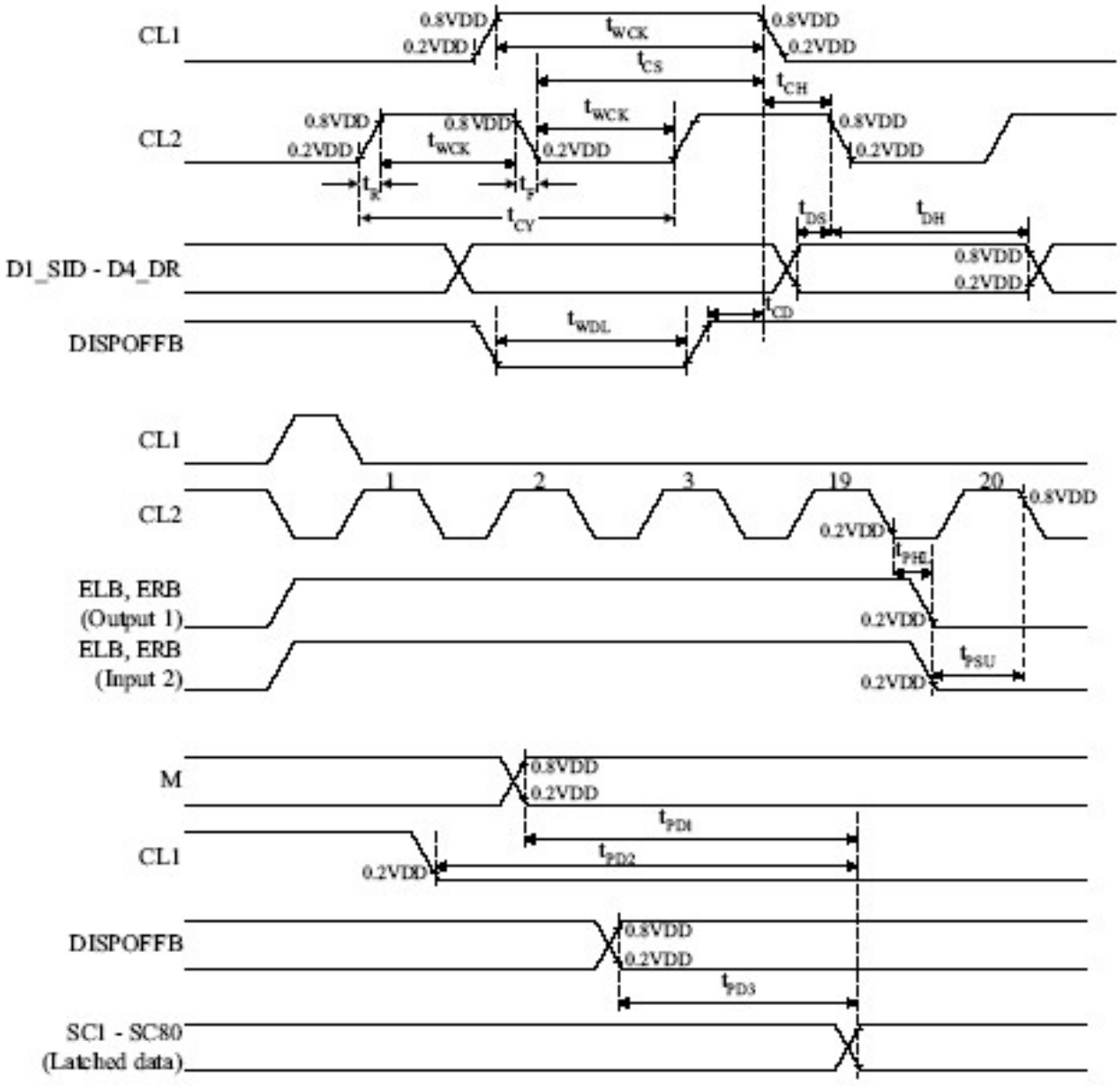
Characteristic	Symbol	Test condition	(1) VDD=5V±10%			(2) VDD=3V±10%			Unit
			Min.	Typ.	Max.	Min.	Typ.	Max.	
Clock cycle time	t_{CY}	Duty=50%	125	-	-	250	-	-	ns
Clock pulse width	t_{WCK}	-	45	-	-	95	-	-	
Clock rise/ fall time	t_R / t_F	-	-	-	-	-	-	30	
Data set-up time	t_{DS}	-	30	-		65	-	-	
Data hold time	t_{DH}	-	30	-		65	-	-	
Clock set-up time	t_{CS}	-	80	-		120	-	-	
Clock hold time	t_{CH}	-	80	-		120	-	-	
Propagation delay time	t_{PHL}	ELB output	-	-	60	-	-	125	
		ERB output			60			125	
ELB,ERB set-up time	t_{PSU}	ELB input	30	-	-	65	-	-	
		ERB input	30			65			
DISPOFFB low pulse width	t_{WDL}	-	1.2	-	-	1.2	-	-	μs
DISPOFFB clear time	t_{CD}	-	100	-	-	100	-	-	ns
M – OUT propagation delay time	t_{PD1}	C_L=15pF	-	-	1.0	-	-	1.2	μs
CL1 – OUT propagation delay time	t_{PD2}		-	-	1.0	-	-	1.2	
DISPOFFB – OUT propagation delay time	t_{PD3}		-	-	1.0	-	-	-	

(2) Common Driver Application

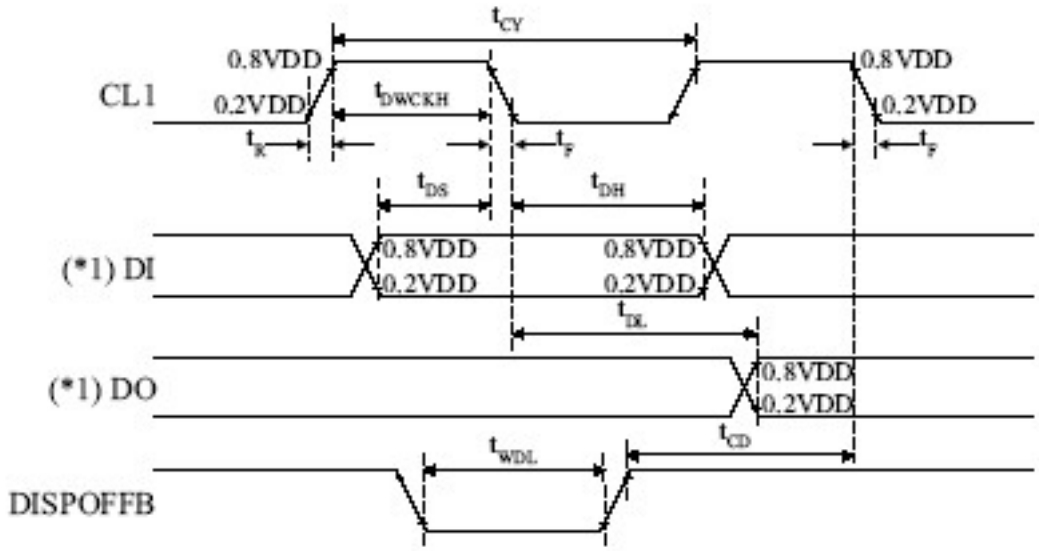
(V_{SS} = 0V, Ta = - 30 ~ +85°C)

Characteristic	Symbol	Test condition	(1) VDD=5V±10%			(2) VDD=3V±10%			Unit
			Min.	Typ.	Max.	Min.	Typ.	Max.	
Clock cycle time	t_{CY}	Duty=50%	250	-	-	500	-	-	ns
Clock pulse width	t_{WCK}	-	45	-	-	95	-	-	
Clock rise/ fall time	t_R / t_F	-	-	-	50	-	-	50	
Data set-up time	t_{DS}	-	30	-		65	-	-	
Data hold time	T_{DH}	-	30	-		65	-	-	
DISPOFFB low pulse width	t_{WDL}	-	1.2	-	-	1.2	-	-	μs
DISPOFFB clear time	t_{CD}	-	100	-	-	100	-	-	ns
Output delay time	t_{DL}	C_L=15pF	-	-	200	-	-	250	
M – OUT propagation delay time	t_{PD1}		-	-	1.0	-	-	1.2	μs
CL1 – OUT propagation delay time	t_{PD2}		-	-	1.0	-	-	1.2	
DISPOFFB – OUT propagation delay time	t_{PD3}		-	-	1.0	-	-	1.2	

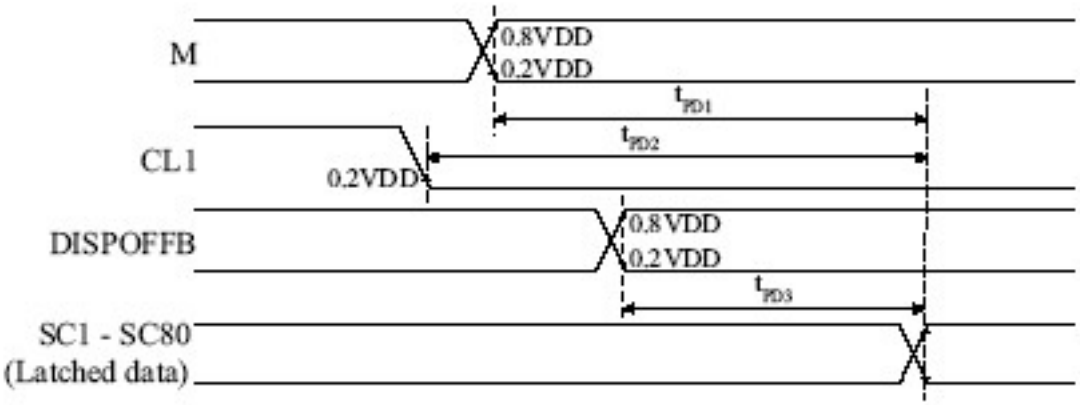
(3) Segment Driver Application Timing



(4) Common Driver Application Timing



(*1) When in single-type interface mode
DI=>DDL(SHL=L), D4_DR(SHL=H)
DO=>D4_DR(SHL=L), D2_DL(SHL=H)
When in dual-type interface mode
DI=>D2_DL and D3_DM(SHL=L),D4_DR and D3_DM(SHL=H)
DO=>D4_DR(SHL=L), D2_DL(SHL=H)



9.RELIABILITY

Content of Reliability Test (wide temperature, -20℃~70℃)

Environmental Test			
Test Item	**Content of Test**	**Test Condition**	**Note**
High Temperature storage	Endurance test applying the high storage temperature for a long time.	80℃ 200hrs	2
Low Temperature storage	Endurance test applying the high storage temperature for a long time.	-30℃ 200hrs	1,2
High Temperature Operation	Endurance test applying the electric stress (Voltage & Current) and the thermal stress to the element for a long time.	70℃ 200hrs	____
Low Temperature Operation	Endurance test applying the electric stress under low temperature for a long time.	-20℃ 200hrs	1
High Temperature/ Humidity Operation	The module should be allowed to stand at 60℃,90%RH max For 96hrs under no-load condition excluding the polarizer, Then taking it out and drying it at normal temperature.	60℃,90%RH 96hrs	1,2
Thermal shock resistance	The sample should be allowed stand the following 10 cycles of operation -20℃ 25℃ 70℃ 30min 5min 30min 1 cycle	-20℃/70℃ 10 cycles	____
Vibration test	Endurance test applying the vibration during transportation and using.	Total fixed amplitude : 1.5mm Vibration Frequency : 10~55Hz One cycle 60 seconds to 3 directions of X,Y,Z for Each 15 minutes	3
Static electricity test	Endurance test applying the electric stress to the terminal.	VS=800V,RS=1.5kΩ CS=100pF 1 time	____

Note1: No dew condensation to be observed.

Note2: The function test shall be conducted after 4 hours storage at the normal Temperature and humidity after remove from the test chamber.

Note3: Vibration test will be conducted to the product itself without putting it in a container.

10. Material List of Components for RoHs

1. JIAGUAN hereby declares that all of or part of products (with the mark "#'in code), including,but not limlted to, the LCM,the LCM, accessores or packages manufactured and/or delivered to your company (including your subsidiaries and affiliated company) directly or indirectly by our company (including our subsidiaries or affiliated companies) do not intentionally contain any of the substances listed in all applicable EU directives and regulations, including the following substances.

Exhibit A：The Harmful Material List

Material	(Cd)	(Pb)	(Hg)	(Cr6+)	PBBs	PBDEs
Limited Value	100 ppm	1000 ppm	1000 ppm	1000 ppm	1000 ppm	1000 ppm
Above limited value is set up according to RoHS.						

2.Process for RoHS requirement：

(1) Use the Sn/Ag/Cu soldering surface；the surface of Pb-free solder is rougher than we used before.

(2) Heat-resistance temp.：

Reflow：250℃,30 seconds Max.；

Connector soldering wave or hand soldering：320℃, 10 seconds max.

(3) Temp. curve of reflow, max. Temp.：235±5℃；

Recommended customer’s soldering temp. of connector：280℃, 3 seconds.

11. Recommendable storage

1. Place the panel or module in the temperature 25°C±5°C and the humidity below 65% RH
2. Do not place the module near organics solvents or corrosive gases.
3. Do not crush, shake, or jolt the module

12.Precautions in Use of LCD Module

(1)Avoid applying excessive shocks to the module or making any alterations or modifications to it.

(2)Don't make extra holes on the printed circuit board, modify its shape or change the components of LCD Module.

(3)Don't disassemble the LCM.

(4)Don't operate it above the absolute maximum rating.

(5)Don't drop, bend or twist LCM.

(6)Soldering: only to the I/O terminals.

(7)Storage: please storage in anti-static electricity container and clean environment.

(8)HOTDISPLAY have the right to change the passive components

(Resistors,capacitors and other passive components will have different appearance and color caused by the different supplier.)

(9)HOTDISPLAY have the right to change the PCB Rev.