Midas Components Limited
Electra House
32 Southtown Road
Great Yarmouth
Norfolk
NR31 0DU
England

Telephone +44 (0)1493 602602
Fax +44 (0)1493 665111
Email sales@midasdisplays.com
Website www.midasdisplays.com

Specification

Part Number:	
Version:	
Date:	

Revision

No.	Date	Description	Item	Page

Contents

2. General Specification

- Resolution: 640 x 320
- Module dimension: 170.32 x 88.3 x 5.3mm
- Active Area : 140.0 x 70.0 mm
- Dot pitch: 0.21875 x 0. 21875 mm
- LCD type: TFT, Negative , Transmissive
- View direction: Wide View
- Backlight Type: LED, Normally Black

*Color tone slight changed by temperature and driving voltage.

Midas Active Matrix Display Part Number System

MC	T	057	A	6	*	W	320240	L	M	L	*	*	*	*	*
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16

1 = **MC:** Midas Components

2 = **T:** TFT **A:** Active Matrix OLED

3 = **Size**

4 = **Series**

5 = **Viewing Angle: 6:** 6 O'clock **12:** 12 O'clock **O:** All round

6 = **Blank:** No Touch **T:** Resistive Touchscreen **C:** Capacitive Touchscreen

7 = **Operating Temp Range:** **S:** 0 to 50Deg C **B:** -20+60Deg C
W: -20+70Deg C **E:** -30+85Deg C

8 = **No of Pixels**

9 = **Orientation:** **P:** Portrait **L:** Landscape

10 = **Mode:** **R:** Reflective **M:** Transmissive **T:** Transflective
S: Sunlight Readable (transmissive)
W: White on Black (Monochrome)

11 = **Backlight:** **Blank:** None **L:** LED **C:** CCFL

12 = **Blank:** No Module/board **C:** Controller board module

13 = **Blank:** None **V**: Video

14 = **Blank:** None **B**: Bracket

15 = **Blank:** None **H**: Host Cable

16 = **Blank:** None **K**: Keyboard

4. Interface Pin Function

4.1. LCM PIN Definition

Pin	Symbol	Function	Remark
1	GND	System ground	
2	VDD	Power Supply : +3.3V	
3	NC	No connect	
4	A0	Data/Command select	
5	/WR(R/W)	Write strobe signal	
6	/RD(E)	Read strobe signal	
7	DB0	Data bus	
8	DB1	Data bus	
9	DB2	Data bus	
10	DB3	Data bus	
11	DB4	Data bus	
12	DB5	Data bus	
13	DB6	Data bus	
14	DB7	Data bus	
15	/CS	Chip select	
16	/RESET(RSTB)	Hardware reset	
17	IF0	Mode select	Note1
18	IF1		
19	NC	No connect	
20	NC	No connect	
21	NC	No connect	
22	NC	No connect	

Note1:

Setting		MCU Type	Interface Pin Function				
IF1	IF0		CSB	A0	RWR	ERD	D[7:0]
L	L	Parallel 8080 series MCU	CSB	A0	/WR	/RD	D[7:0]
L	H	Parallel 6800 series MCU			R/W	E	
H	H	Serial 4-Line series MCU			-	-	D7=SCL, D0=SDA, D[6:1] are not used
H	L	Serial 3-Line series MCU		-	-	-	

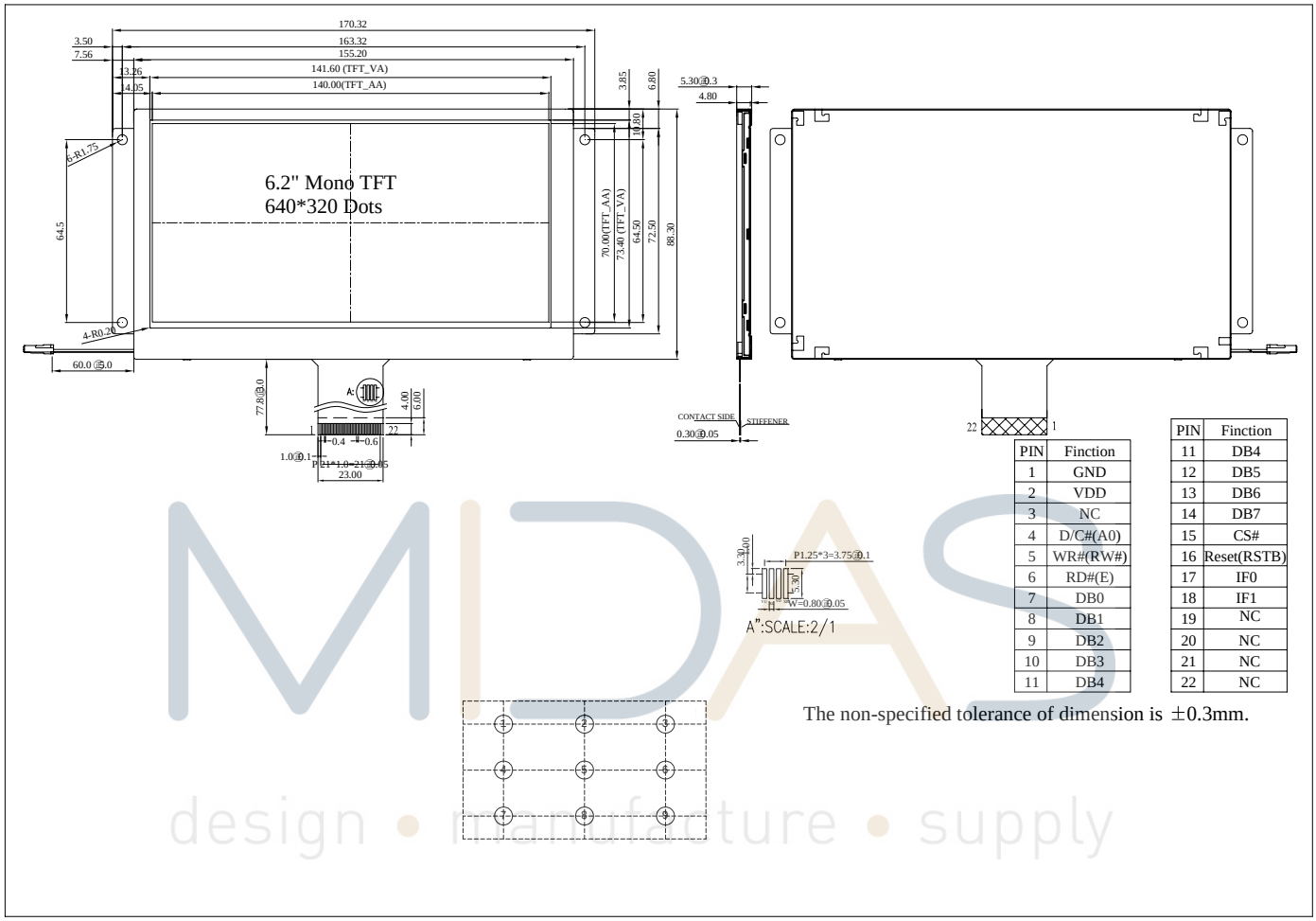
The un-used pins are marked as “-” and should be connected to “H” by VDDI.

4.2. Backlight Unit Section(CN2)

LED Light Bar connector is used for the the integral backlight system. The recommended model is “JST XH-3” manufactured by JST.

Pin No.	Symbol	I/O	Function	Remark
1	V_{LED+}	P	Power for LED backlight anode (A)	Red
3	V_{LED-}	P	Power for LED backlight cathode (K)	Black

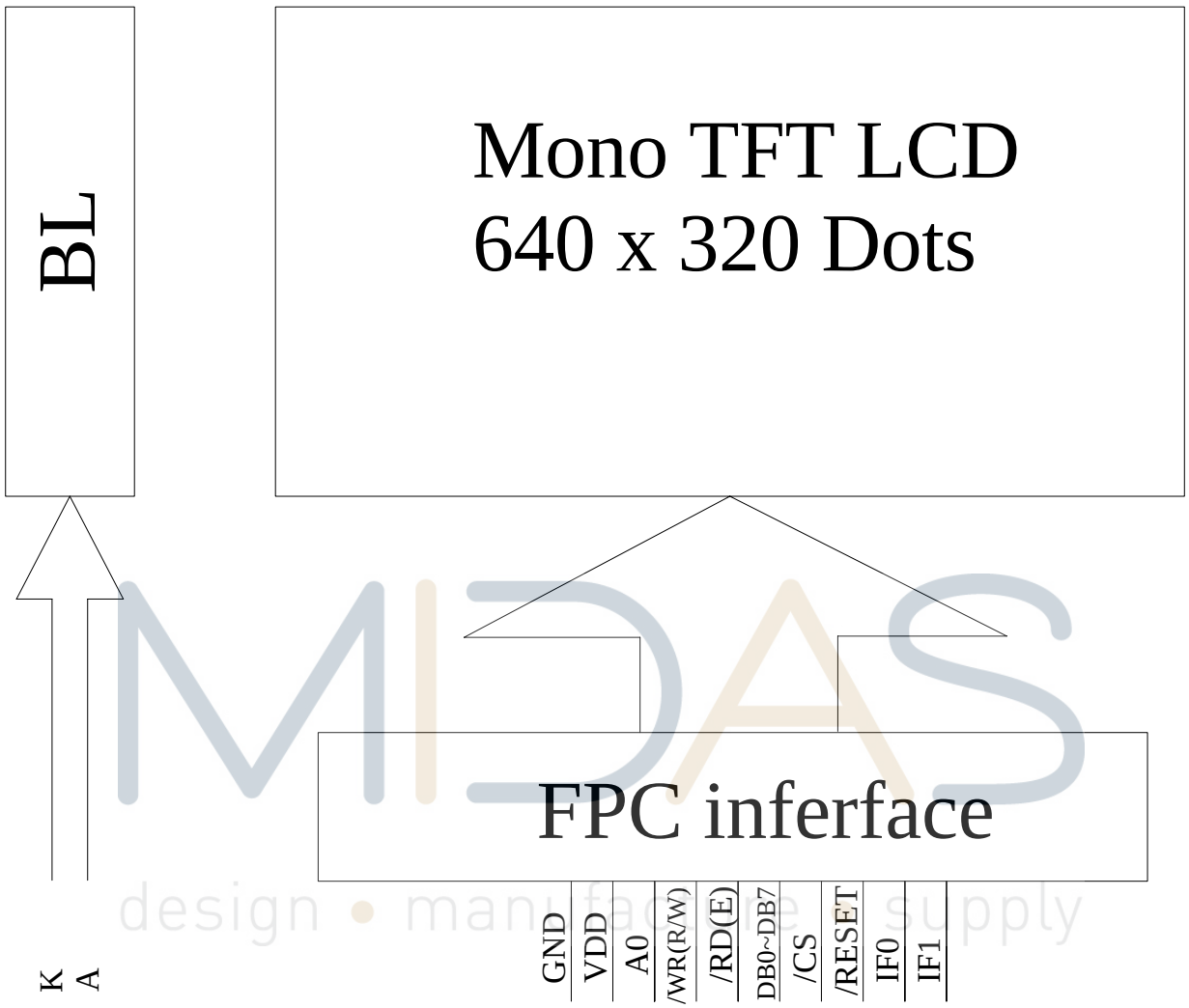
5. Mechanical Drawing



PIN	Finction
1	GND
2	VDD
3	NC
4	D/C#(A0)
5	WR#(RW#)
6	RD#(E)
7	DB0
8	DB1
9	DB2
10	DB3
11	DB4

PIN	Finction
11	DB4
12	DB5
13	DB6
14	DB7
15	CS#
16	Reset(RSTB)
17	IF0
18	IF1
19	NC
20	NC
21	NC
22	NC

6. Block Diagram

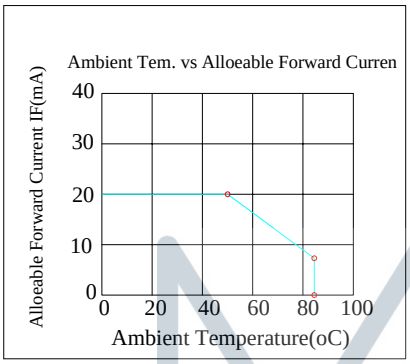


7. Absolute Maximum Ratings

Item	Symbol	Min	Typ	Max	Unit
Operating Temperature	TOP	-20	—	+70	℃
Storage Temperature	TST	-30	—	+80	℃

Note: Device is subject to be damaged permanently if stresses beyond those absolute maximum ratings listed above

1. Temp. ≦60℃, 90% RH MAX. Temp. ＞ 60℃, Absolute humidity shall be less than 90% RH at 60℃



8. Electrical Characteristics

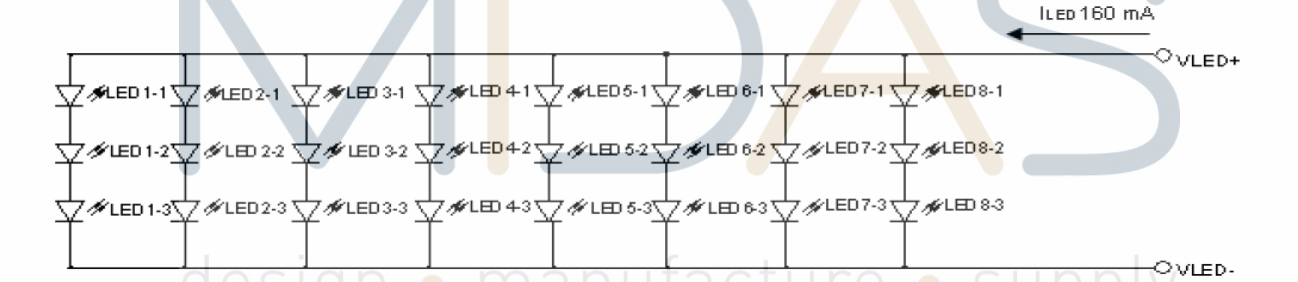
8.1. Operating conditions:

Item	Symbol	Condition	Min	Typ	Max	Unit	Remark
Supply Voltage For LCM	VDD	—	3.0	3.3	3.6	V	
Supply Current For LCM	IDD	—	—	25	38	mA	Note1
Power Consumption	—	—	—	83	137	mW	

Note1: This value is test for VDD=3.3V only

8.2 LED driving conditions

Parameter	Symbol	Min.	Typ.	Max.	Unit	Remark
LED current		-	160	-	mA	
Power Consumption		1392	-	1680	mW	
LED voltage	A-K	8.7	9.6	10.5	V	Note 1
LED Life Time		-	20,000	-	Hr	Note 2,3,4



Note 1 : Power supply the back light specification

Note 2 : Ta = 25 ℃

Note 3 : Brightness to be decreased to 50% of the initial value

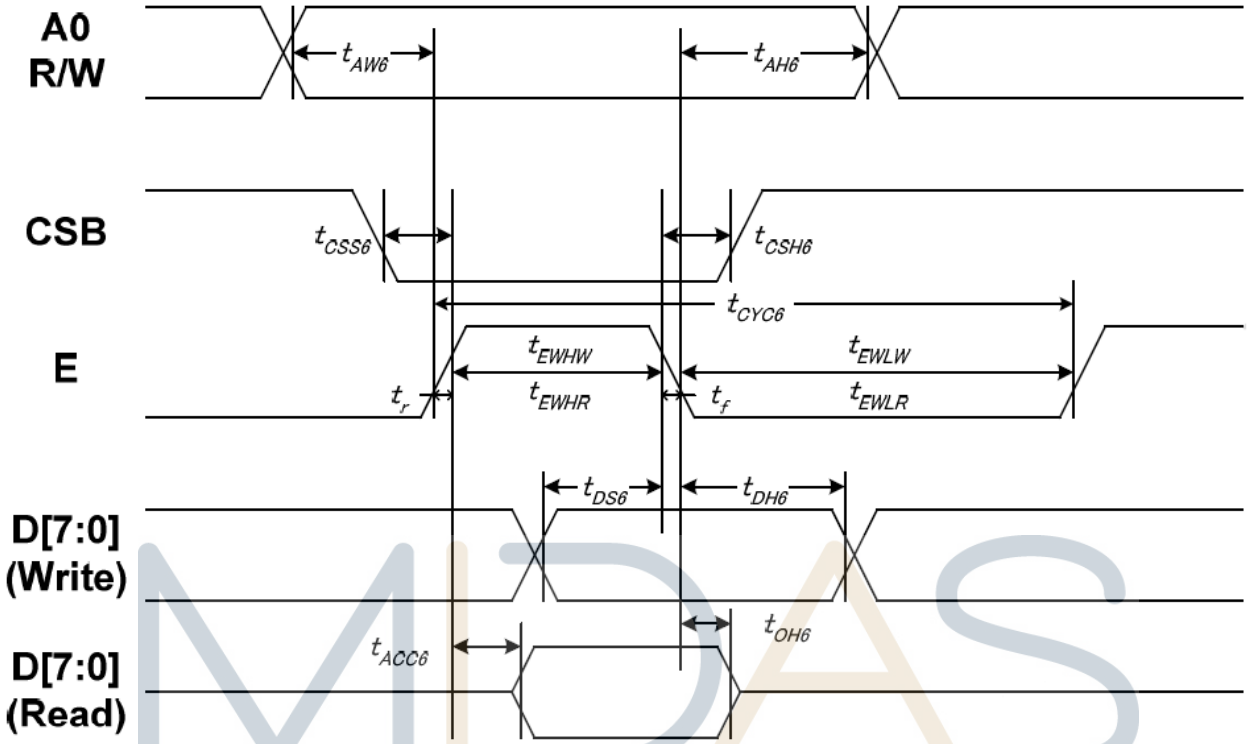
Note 4 : The single LED lamp case

9. DC Characteristics

Parameter	Symbol	Rating			Unit	Condition
		Min	Typ	Max		
Low level input voltage	V_{IL}	0	-	0.3VDD	V	
High level input voltage	V_{IH}	0.7VDD	-	VDD	V	

10. AC Characteristics

10.1 System Bus Timing for 6800 Series MPU

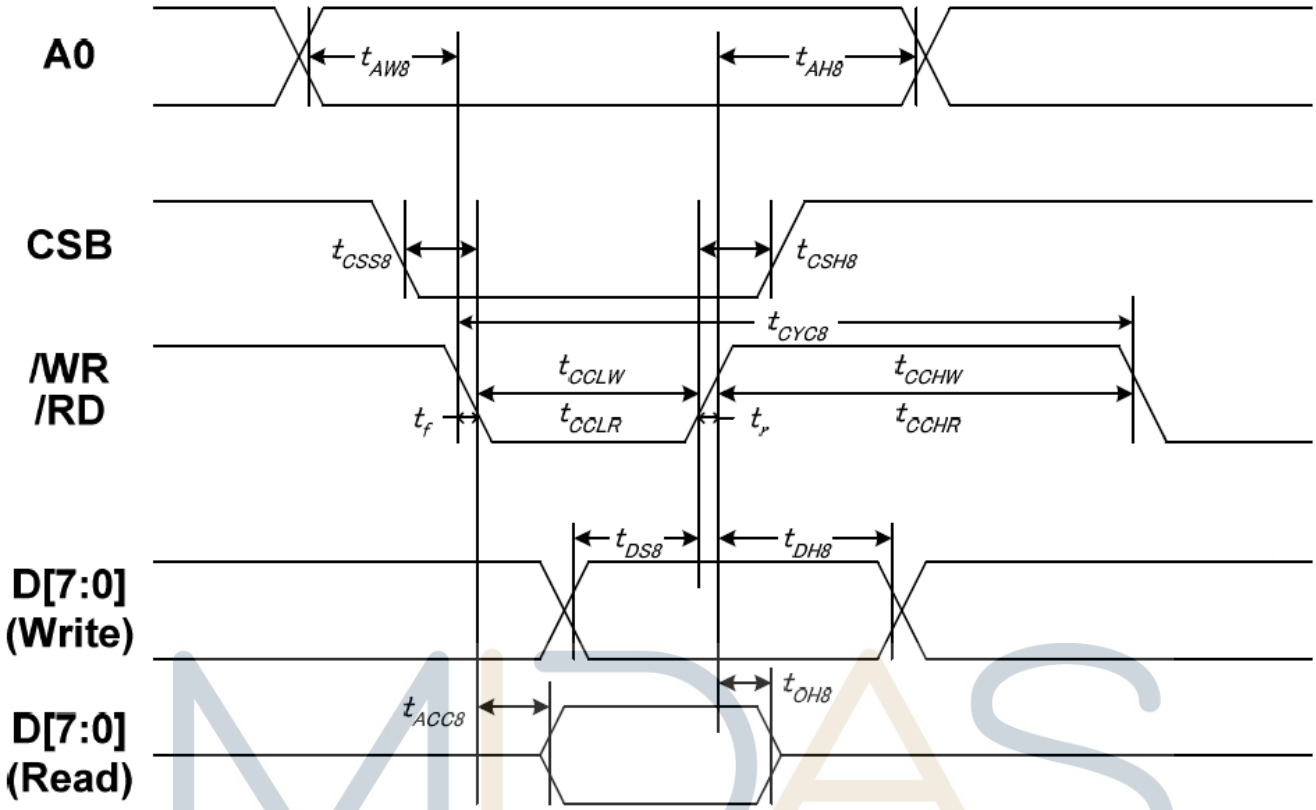


Item	Signal	Symbol	Condition	Min	Max	Unit
Address setup time	A0	tAW6	-	10	-	ns
Address hold time		tAH6	-	0	-	
System cycle time	E	tCYC6	-	200	-	
Enable L pulse width (WRITE)		tEWLW	-	100	-	
Enable H pulse width (WRITE)		tEWHW	-	100	-	
Enable L pulse width (READ)		tEWLR	-	130	-	
Enable H pulse width (READ)		tEWHR	-	130	-	
CSB setup time	CSB	tCSS6	-	100	-	
CSB hold time		tCSH6	-	100	-	
Write data setup time	D[7:0]	tDS6	-	70	-	
Write data hold time		tDH6	-	20	-	
Read data access time		tACC6	CL = 100 pF	-	80	
Read data output disable time		tOH6	CL = 100 pF	15	80	

Note:

1. The input signal rise time and fall time (tr, tf) is specified at 15 ns or less. When the system cycle time is extremely fast,(tr + tf) ≤ (tCYC8 – tCCLW – tCCHW) for (tr + tf) ≤ (tCYC8 – tCCLR – tCCHR) are specified.
2. All timing is specified using 20% and 80% of VDDI as the reference.
3. tCCLW and tCCLR are specified as the overlap between CSB being “L” and /WR and /RD being at the “L” level.CSB and /WR (or /RD) cannot act at the same time and CSB should be 100ns wider than /WR (or /RD).

10.2 System Bus Timing for 8080 Series MPU



Item	Signal	Symbol	Condition	Min	Max	Unit
Address setup time	A0	tAW8	-	10	-	ns
Address hold time		tAH8	-	0	-	
System cycle time	/WR	tCYC8	-	200	-	
/WR L pulse width (WRITE)		tCCLW	-	100	-	
/WR H pulse width (WRITE)		tCCHW	-	100	-	
/RD L pulse width (READ)	/RD	tCCLR	-	120	-	
/RD H pulse width (READ)		tCCHR	-	120	-	
CSB setup time	CSB	tCSS8	-	100	-	
CSB hold time		tCSH8	-	100	-	
Write data setup time	D[7:0]	tDS8	-	70	-	
Write data hold time		tDH8	-	20	-	
Read data access time		tACC8	CL = 100 pF	-	80	
Read data output disable time		tOH8	CL = 100 pF	15	80	

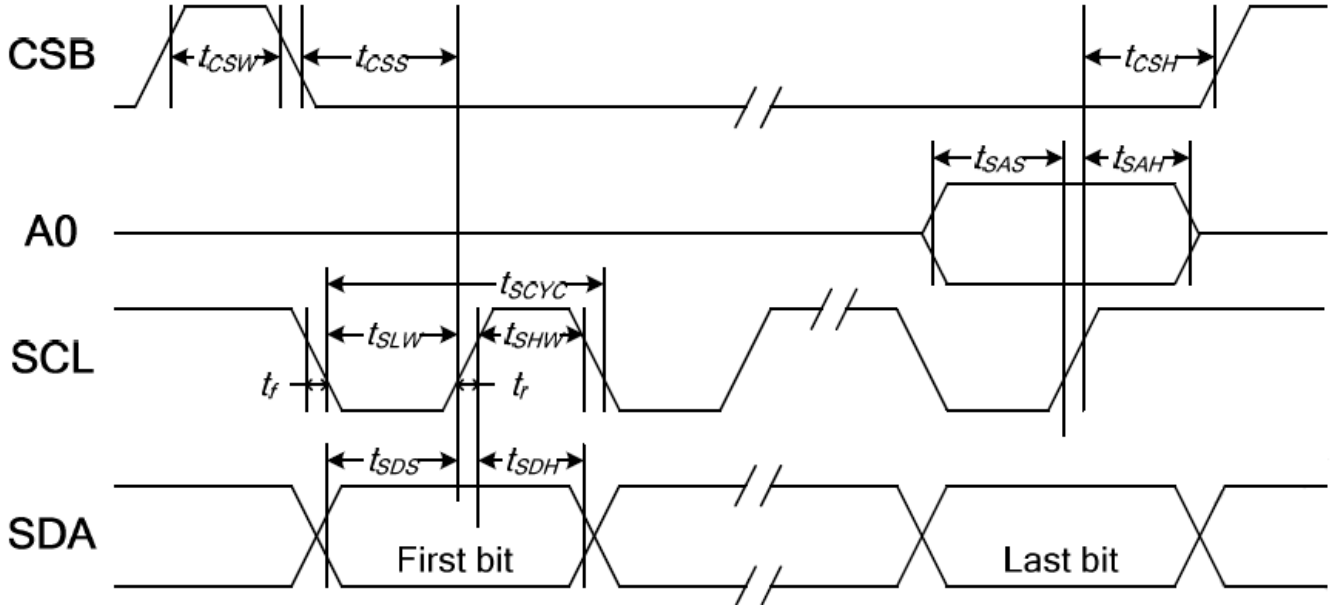
Note:

1. The input signal rise time and fall time (tr, tf) is specified at 15 ns or less. When the system cycle time is extremely fast,(tr + tf) ≤ (tCYC8 – tCCLW – tCCHW) for (tr + tf) ≤ (tCYC8 – tCCLR – tCCHR) are specified.

2. All timing is specified using 20% and 80% of VDDI as the reference.

3. tCCLW and tCCLR are specified as the overlap between CSB being “L” and /WR and /RD being at the “L” level.CSB and /WR (or /RD) cannot act at the same time and CSB should be 100ns wider than /WR (or /RD).

10.3 System Bus Timing for 4-Line Serial Interface

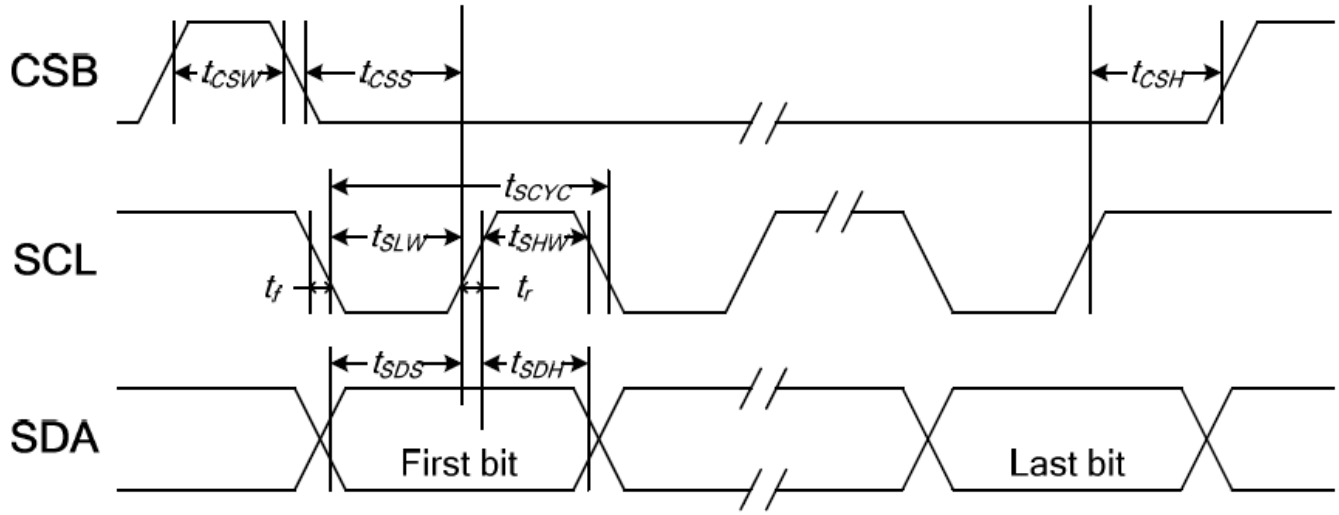


Item	Signal	Symbol	Condition	Min	Max	Unit
Serial clock period	SCL	tSCYC	-	80	-	ns
SCL “H” pulse width		tSHW	-	40	-	
SCL “L” pulse width		tSLW	-	40	-	
Address setup time	A0	tSAS	-	40	-	
Address hold time		tSAH	-	40	-	
Data setup time	SDA	tSDS	-	15	-	
Data hold time		tSDH	-	20	-	
CSB-SCL time	CSB	tCSS	-	40	-	
CSB-SCL time		tCSH	-	40	-	
CSB “H” pulse width		tCSW	-	15	-	

Note:

1. The input signal rise and fall time (tr, tf) are specified at 15 ns or less.
2. All timing is specified using 20% and 80% of VDDI as the standard.

10.4 System Bus Timing for 3-Line Serial Interface



Item	Signal	Symbol	Condition	Min	Max	Unit
Serial clock period	SCL	tSCYC	-	80	-	ns
SCL “H” pulse width		tSHW	-	40	-	
SCL “L” pulse width		tSLW	-	40	-	
Data setup time	SDA	tSDS	-	15	-	
Data hold time		tSDH	-	20	-	
CSB-SCL time	CSB	tCSS	-	40	-	
CSB-SCL time		tCSH	-	40	-	
CSB “H” pulse width		tCSW	-	15	-	

Note:

1. The input signal rise and fall time (tr, tf) are specified at 15 ns or less.
2. All timing is specified using 20% and 80% of VDDI as the standard.

11. Optical Characteristic

Item		Symbol	Temp	Condition.	Min	Typ.	Max.	Unit	Remark
Response time		Tr	25℃	θ=0°、Φ=0	-	8	-	.ms	Note 3
		Tf	25℃		-	12	-		
Contrast ratio		CR	25℃	At optimized viewing angle	-	800	-	-	Note 4
Viewing angle	Hor.	ΘR	25℃	CR≧10	80			Deg.	Note 1 Note 2
		ΘL	25℃		80				
	Ver.	ΦB	25℃		80				
		ΦT	25℃		80				
Brightness		-	25℃	-	500	600	-	cd/m^2	Center of display

Ta=25±2℃, IL=160mA

Note 1: Definition of viewing angle range

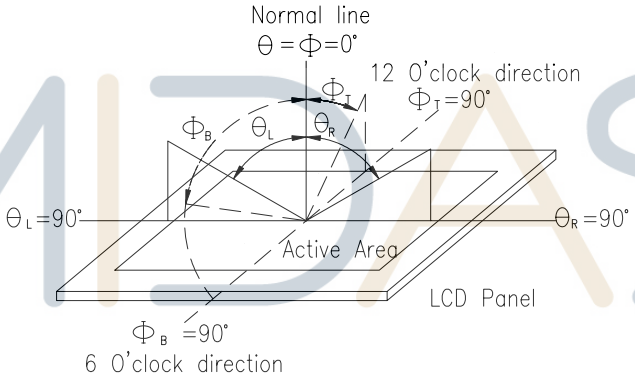


Fig. 11-1 Definition of viewing angle

Note 2: Test equipment setup:After stabilizing and leaving the panel alone at a driven temperature for 10 minutes, the measurement should be executed. Measurement should be executed in a stable, windless, and dark room. Optical specifications are measured by Topcon BM-7(BM-5) luminance meter 1.0° field of view at a distance of 50cm and normal direction.

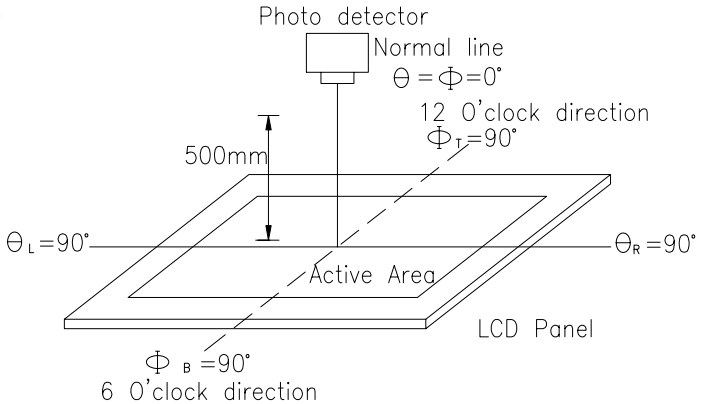
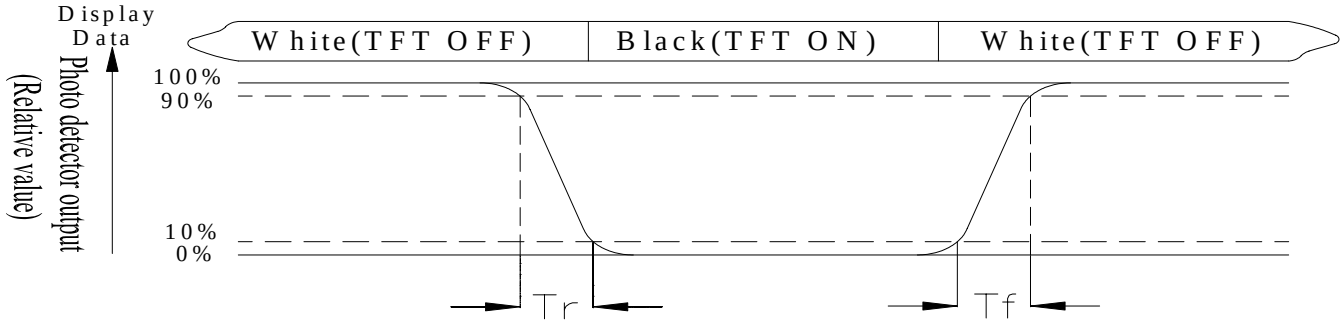


Fig. 11-2 Optical measurement system setup

Note 3: Definition of Response time: Definition of response time：The response time is defined as the time interval between the 10% and 90% amplitudes.



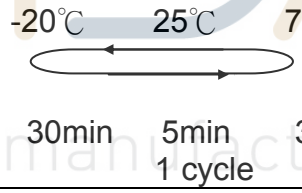
Note 4: Definition of contrast ratio : The contrast ratio is defined as the following expression.

$$\text{Contrast ratio (CR)} = \frac{\text{Luminance measured when LCD on the "White" state}}{\text{Luminance measured when LCD on the "Black" state}}$$

$$\text{Note 8:Uniformity (U)} = \frac{\text{Brightness(min)}}{\text{Brightness(max)}} \quad 100\%$$

12. Reliability

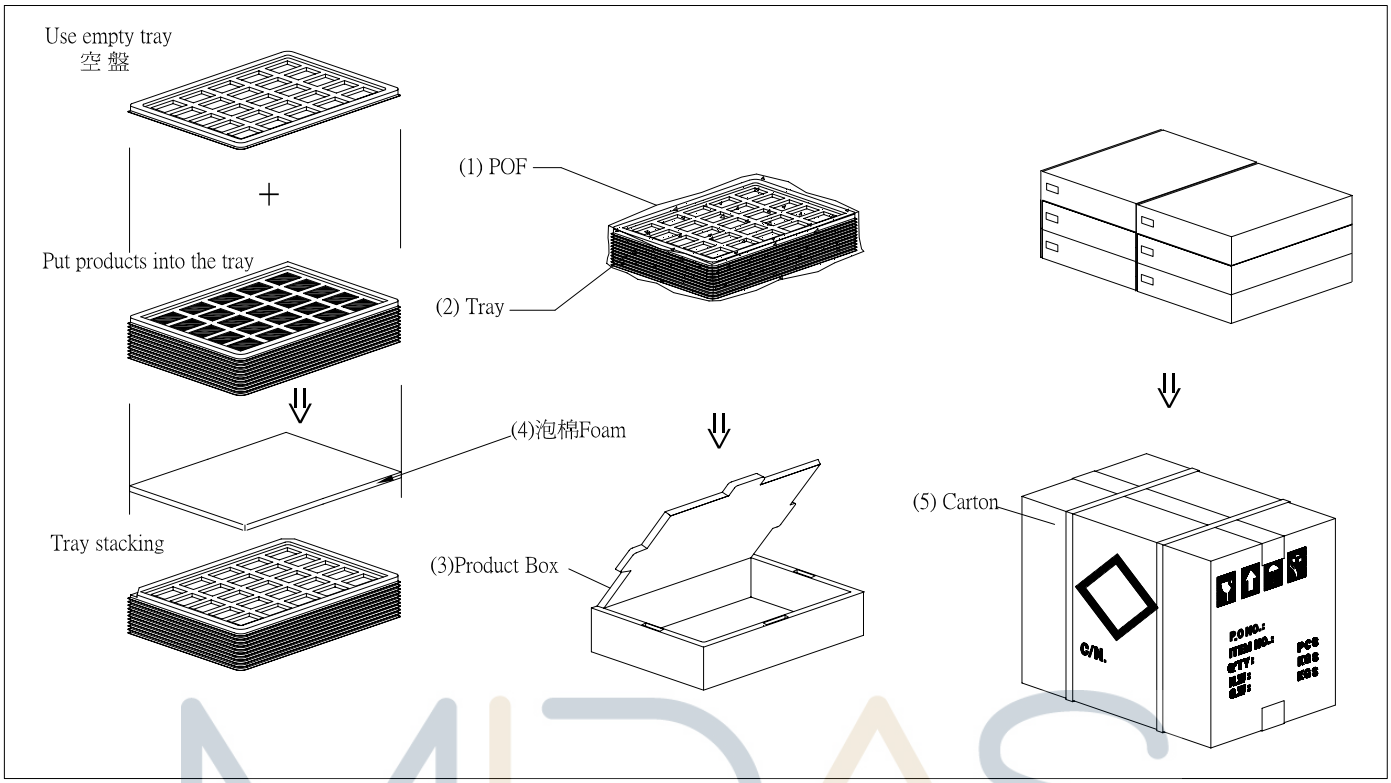
Content of Reliability Test (Wide temperature, -20℃~70℃)

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 low 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℃/70℃ 10 cycles	——
Vibration test	Endurance test applying the vibration during transportation and using.	Total fixed amplitude : 15mm 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: The packing have to including into the vibration testing.



14. Initial Code For Reference

```
void Initial_code()
{
    Write_Command(0xae);
    Write_Data(0xa5);

    Write_Command(0x61);
    Write_Data(0x0f);
    Write_Data(0x04);
    Write_Data(0x02);
    Write_Data(0xa5);

    Write_Command(0x62);
    Write_Data(0x00);
    Write_Data(0x3b);
    Write_Data(0x1b);
    Write_Data(0xa5);

    Write_Command(0x63);
    Write_Data(0x05);
    Write_Data(0x0f);
    Write_Data(0xa5);
    Write_Data(0xa5);

    Write_Command(0x24);
    Write_Data(0x01);
    Write_Data(0xa5);
    Write_Data(0xa5);
    Write_Data(0xa5);

    Write_Command(0x22);
    Write_Data(0x02);
    Write_Data(0xa5);
    Write_Data(0xa5);
    Write_Data(0xa5);

    Write_Command(0x91);
    Write_Data(0x00);
```

```
Write_Data(0x21);
Write_Data(0x23);
Write_Data(0x24);

Write_Command(0x92);
Write_Data(0x27);
Write_Data(0x28);
Write_Data(0x29);
Write_Data(0x2a);

Write_Command(0x93);
Write_Data(0x2b);
Write_Data(0x2c);
Write_Data(0x2d);
Write_Data(0x2e);

Write_Command(0x94);
Write_Data(0x30);
Write_Data(0x31);
Write_Data(0x32);
Write_Data(0x3f);

Write_Command(0x99);
Write_Data(0x00);
Write_Data(0x21);
Write_Data(0x23);
Write_Data(0x26);

Write_Command(0x9a);
Write_Data(0x27);
Write_Data(0x28);
Write_Data(0x29);
Write_Data(0x2a);

Write_Command(0x9b);
Write_Data(0x2b);
Write_Data(0x2c);
Write_Data(0x2d);
Write_Data(0x2e);
```

```
    Write_Command(0x9c);
    Write_Data(0x30);
    Write_Data(0x35);
    Write_Data(0x3b);
    Write_Data(0x3f);

    Write_Command(0x12);
    Write_Data(0xa5);

    Write_Command(0x15);
    Write_Data(0xa5);

}
```

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