

Specification				
Part Number:		MCT035H6X240320PWL		
Version:				
Date:				
Revision				
No.	Date	Description	Item	Page
DISPLAYS				

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2. General Specification

This technical specification applies to 3.45' TFT-LCD panel. The 3.45' TFT-LCD panel is designed for camcorder, digital camera application and other electronic products which require high quality flat panel displays. This module follows RoHS.

- Dot Matrix: 240 x 320
- Module dimension: 62.9 x 86.54 x 4.1 mm
- Active Area: 53.28 x 71.04 mm
- Dot pitch: 0.222 x 0.222 mm
- LCD type: TFT, Mono Transmissive
- View Direction: Wide View
- Backlight Type: LED, Normally White

*Color tone slight changed by temperature and driving voltage.

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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

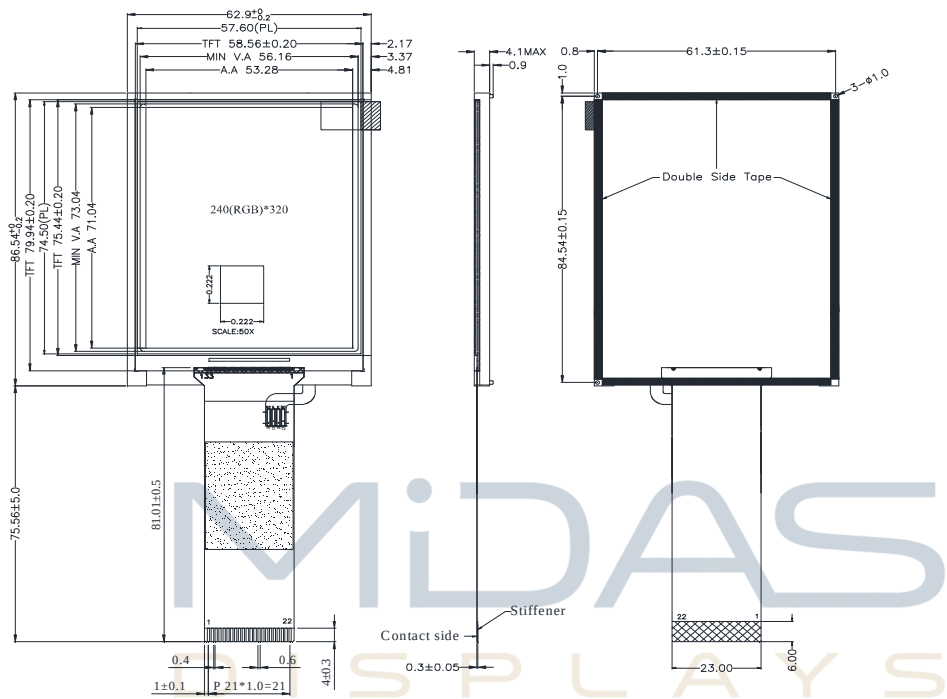
Pin	Symbol	Function	Remark
1	GND	System ground	
2	VDD	Power Supply : +3.3V	
3	NC	No connect	
4	A0	Data/Command select	
5	/WR(R/W)	Write strobe signal	
6	/RD(E)	Read strobe signal	
7	DB0	Data bus	
8	DB1	Data bus	
9	DB2	Data bus	
10	DB3	Data bus	
11	DB4	Data bus	
12	DB5	Data bus	
13	DB6	Data bus	
14	DB7	Data bus	
15	/CS	Chip select	
16	/RESET(RSTB)	Hardware reset	
17	IF0	Mode select	Note1
18	IF1		
19	A	LED +	
20	K	LED -	
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	D[7:0]
H	H	Serial 4-Line series MCU			-	-	D7=SCL, D0=SDA, D[6:1]
H	L	Serial 3-Line series MCU			-	-	are not used

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

5. Contour Drawing

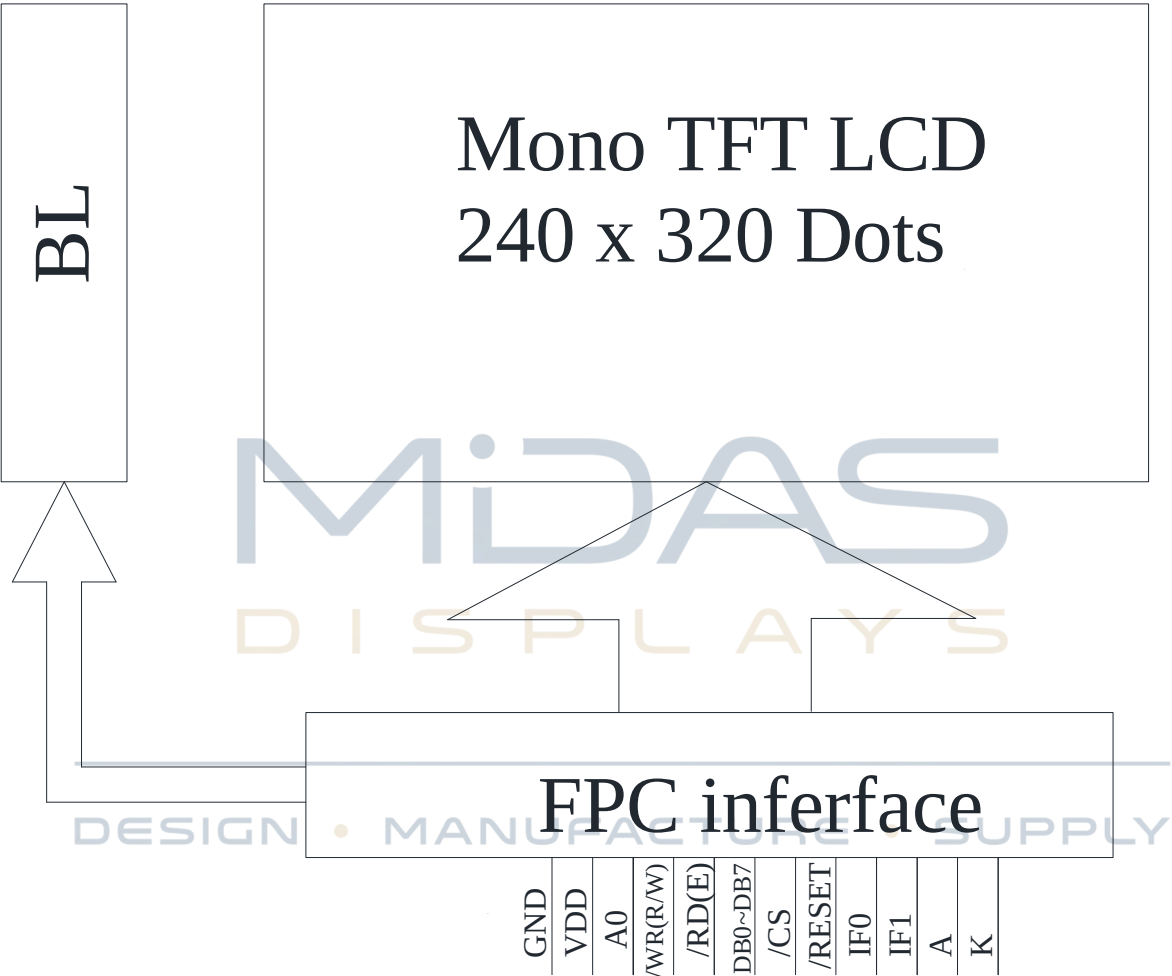


PIN	Finction
1	GND
2	VDD
3	NC
4	A0
5	/WR(/RW)
6	/RD(E)
7	DB0
8	DB1
9	DB2
10	DB3
11	DB4
12	DB5
13	DB6
14	DB7
15	/CS
16	/Reset
17	IFO
18	IF1
19	A
20	K
21	NC
22	NC

The non-specified tolerance of dimension is ±0.3mm.

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6.Block Diagram

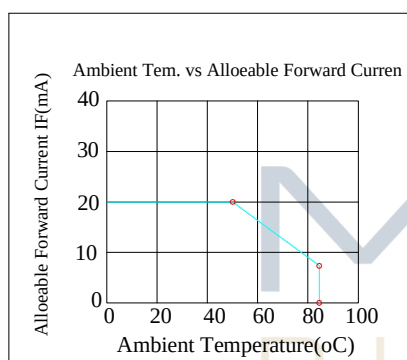


7.Absolute Maximum Ratings

Item	Symbol	Min	Typ	Max	Unit
Operating Temperature	TOP	-30	—	+80	°C
Storage Temperature	TST	-30	—	+80	°C

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

1. Temp. $\leq 60^{\circ}\text{C}$, 90% RH MAX. Temp. $> 60^{\circ}\text{C}$, Absolute humidity shall be less than 90% RH at 60°C



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8. Electrical Characteristics

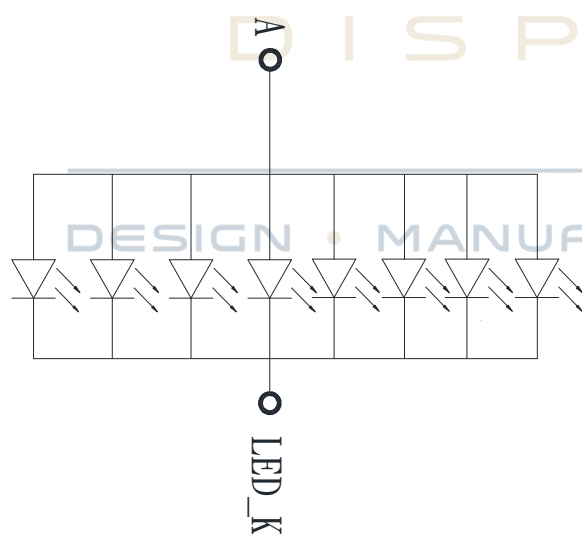
8.1. Operating conditions:

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	—	—	13	—	mA	Note1
Power Consumption	—	—	—	—	46.8	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		—	—	—	mW	
LED voltage	A-K	2.8	3.0	3.3	V	Note 1
LED Life Time			50,000	—	Hr	Note 2,3,4



Note 1 : Power supply the back light specification

Note 2 : Ta = 25 °C

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

Note 4 : The single LED lamp case

9.DC CHARATERISTICS

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	

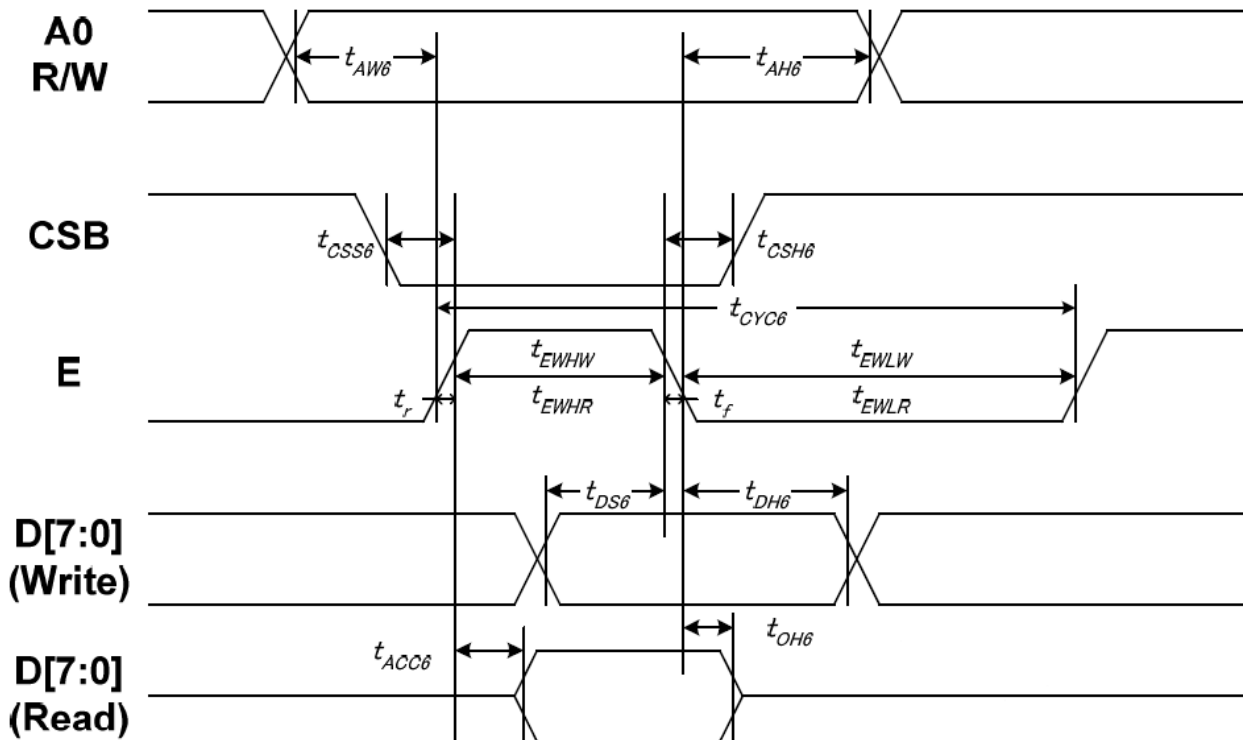
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10.AC CHARATERISTICS

10.1. System Bus Timing for 6800 Series MPU

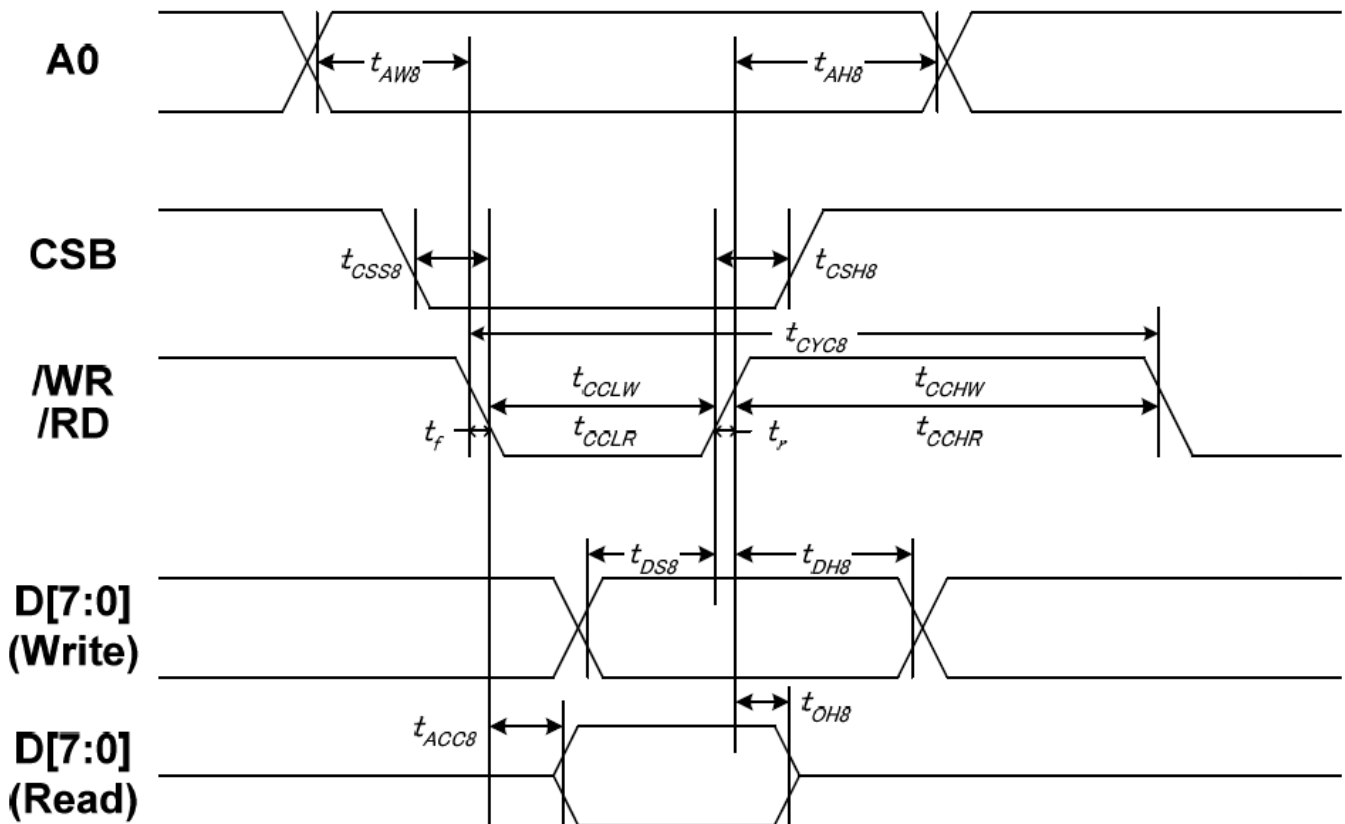


Item	Signal	Symbol	Condition	Min	Max	Unit
Address setup time	A0	tAW6	-	10	-	ns
Address hold time	A0	tAH6	-	0	-	
System cycle time		tCYC6	-	200	-	
Enable L pulse width (WRITE)	E	tEHLW	-	100	-	
Enable H pulse width (WRITE)		tEHLW	-	100	-	
Enable L pulse width (READ)		tEHLR	-	130	-	
Enable H pulse width (READ)		tEHLR	-	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 (t_r , t_f) is specified at 15 ns or less. When the system cycle time is extremely fast, $(t_r + t_f) \leq (t_{CYC6} - t_{CCLW} - t_{CCHW})$ for $(t_r + t_f) \leq (t_{CYC6} - t_{CCLR} - t_{CCHR})$ are specified.
2. All timing is specified using 20% and 80% of VDDI as the reference.
3. t_{CCLW} and t_{CCLR} 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

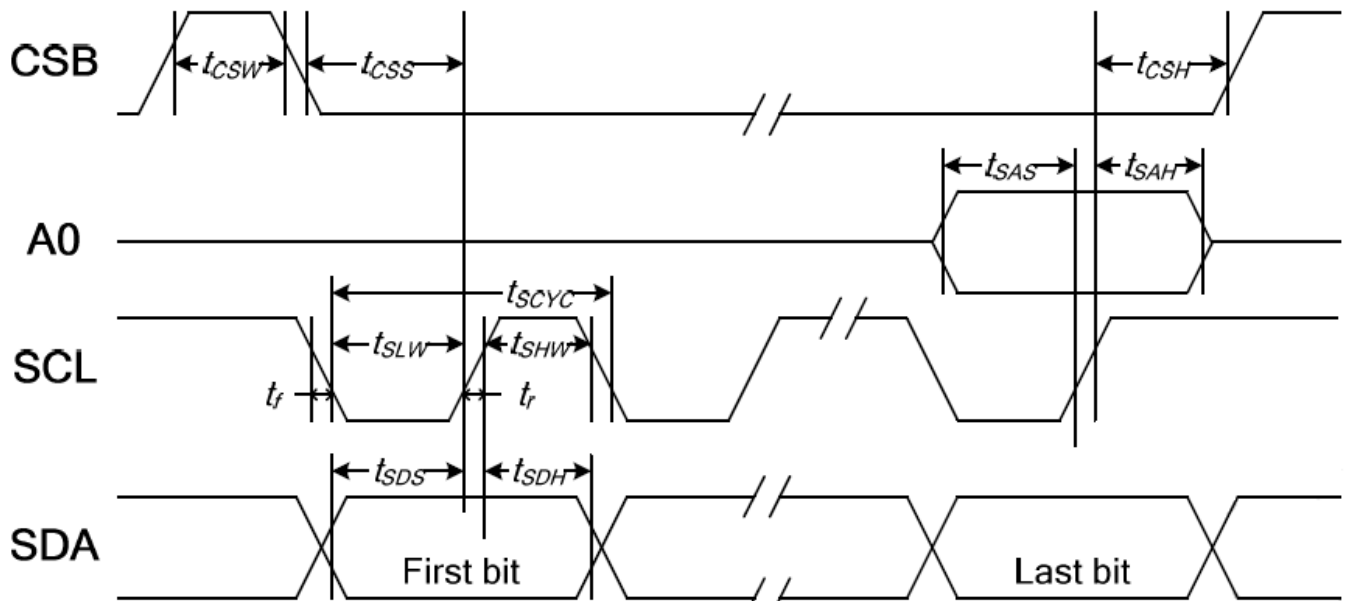


Item	Signal	Symbol	Condition	Min	Max	Unit
Address setup time	A0	tAW8	-	10	-	ns
Address hold time		tAH8	-	0	-	
System cycle time		tCYC8	-	200	-	
/WR L pulse width (WRITE)	/WR	tCCLW	-	100	-	
/WR H pulse width (WRITE)		tCCHW	-	100	-	
/RD L pulse width (READ)	/RD	tCCLR	-	120	-	
/RD H pulse width (READ)		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 (t_r , t_f) is specified at 15 ns or less. When the system cycle time is extremely fast, $(t_r + t_f) \leq (t_{CYC8} - t_{CCLW} - t_{CCHW})$ for $(t_r + t_f) \leq (t_{CYC8} - t_{CCLR} - t_{CCHR})$ 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

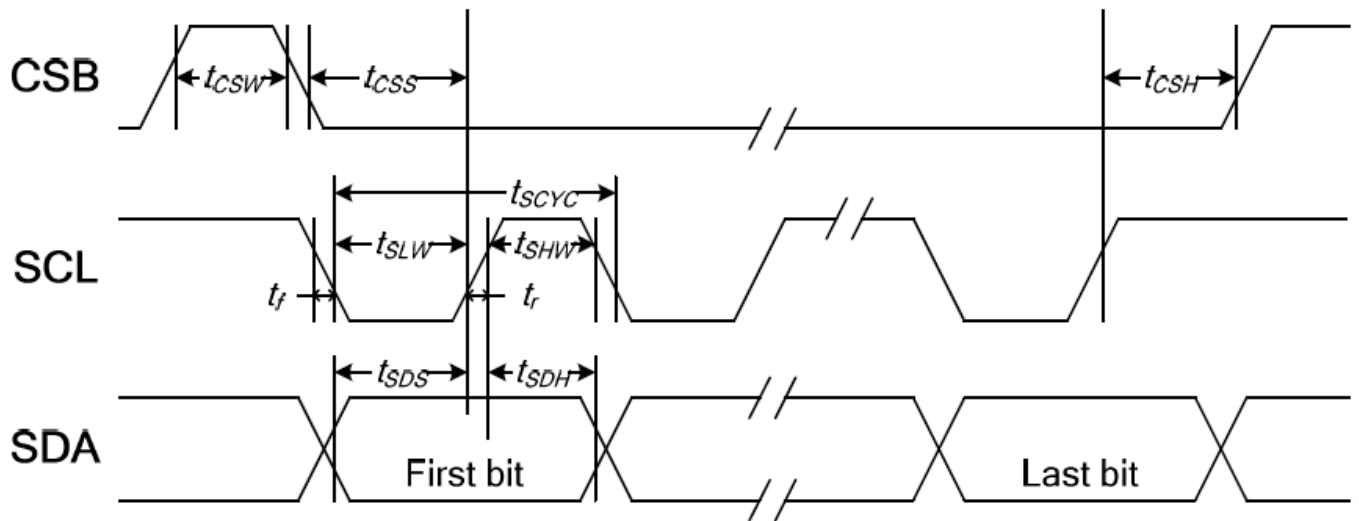


Item	Signal	Symbol	Condition	Min	Max	Unit
Serial clock period	SCL	tSCYC	-	80	-	ns
SCL "H" pulse width		tSHW	-	40	-	
SCL "L" pulse width		tSLW	-	40	-	
Address setup time	A0	tSAS	-	40	-	
Address hold time		tSAH	-	40	-	
Data setup time	SDA	tSDS	-	15	-	
Data hold time		tSDH	-	20	-	
CSB-SCL time	CSB	tCSS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

Note:

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

11.Optical Characteristics

Item		Symbol	Temp	Condition.	Min	Typ.	Max.	Unit	Remark
Response time		Tr	25℃	θ=0°、Φ=0	-	35	-	.ms	Note 3
		Tf	25℃		-		-		
Contrast ratio		CR	25℃	At optimized viewing angle	-	900	-	-	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℃	-	400	500	-	cd/m ²	Center of display

Ta=25±2℃, IL=160mA

Note 1: Definition of viewing angle range

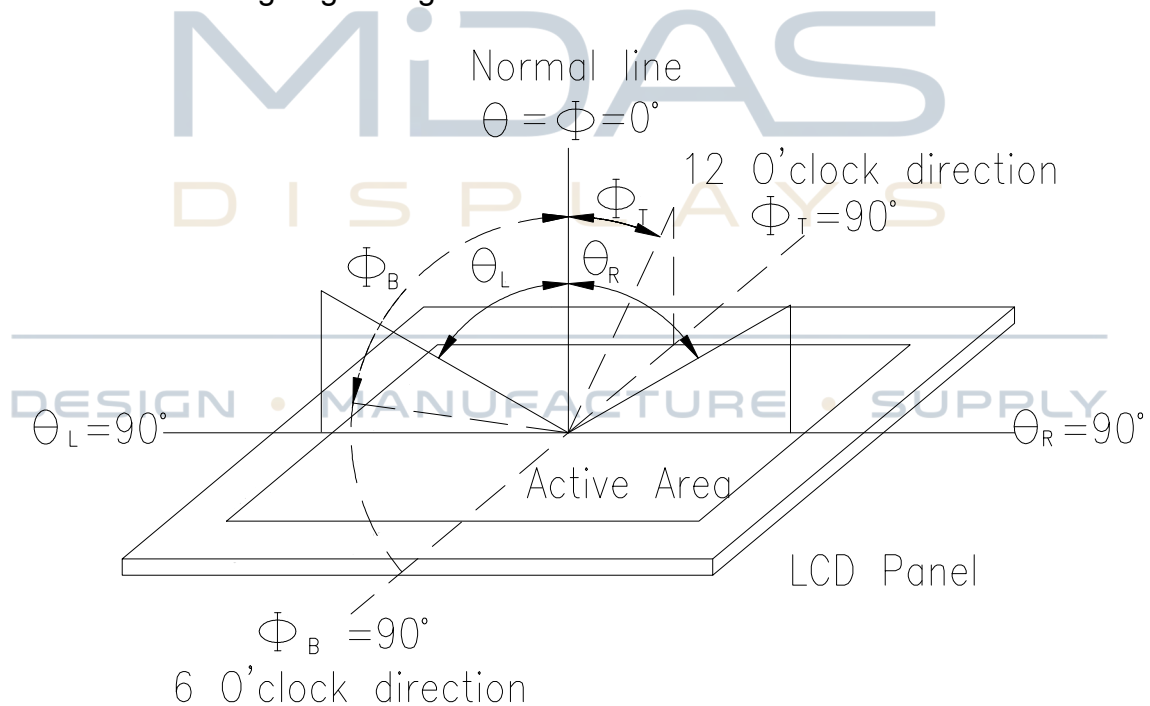


Fig. 11.1. Definition of viewing angle

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.

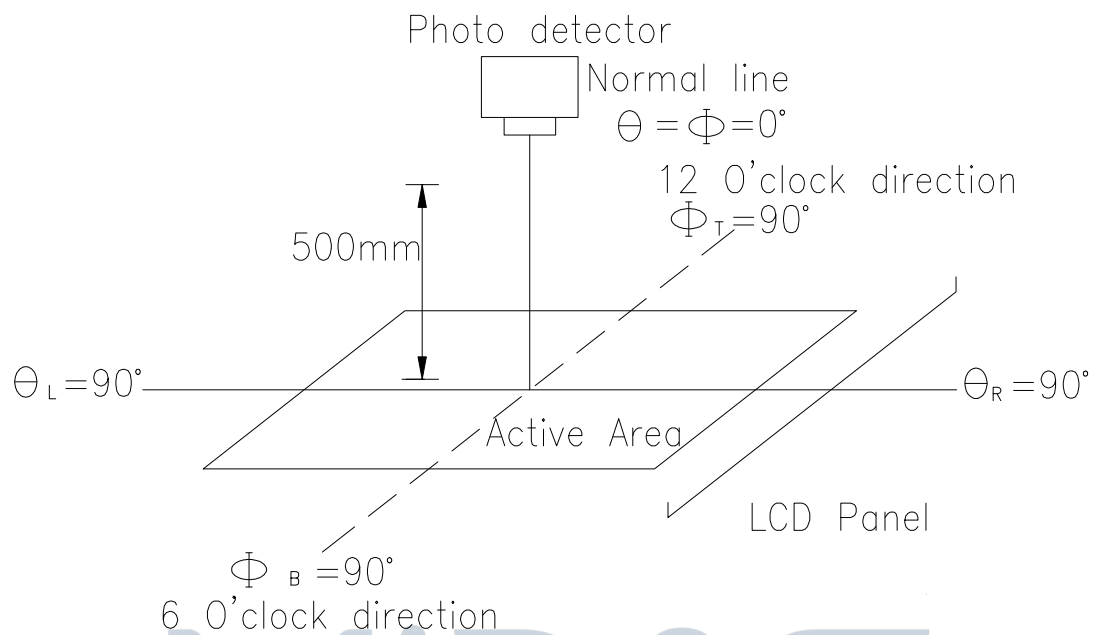
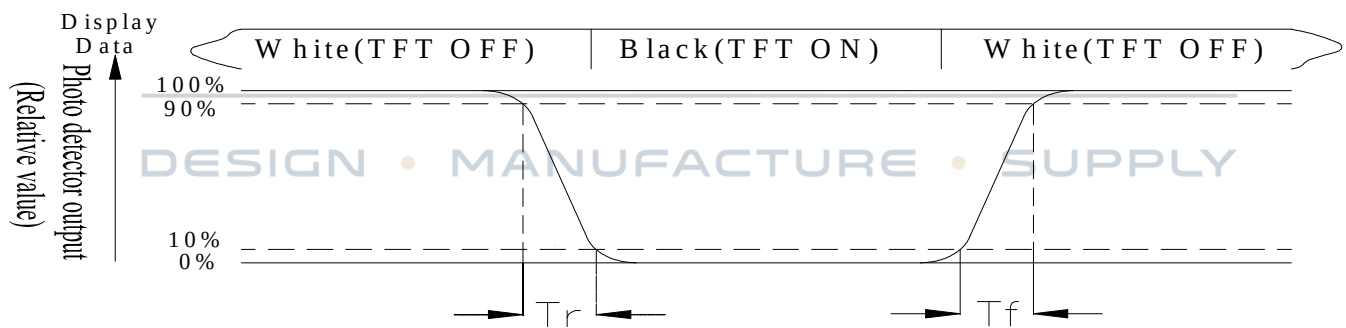


Fig. 11.2. Optical measurement system setup

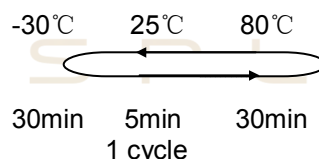
Note 3: Definition of Response time: Definition of response time : The response time is defined as the time interval between the 10% and 90% amplitudes.



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

12. Reliability

Content of Reliability Test (Super Wide temperature, -30°C~80°C)

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°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 thermal stress to the element for a long time.	80°C 200hrs	—
Low Temperature Operation	Endurance test applying the electric stress under low temperature for a long time.	-30°C 200hrs	1
High Temperature/ Humidity storage	The module should be allowed to stand at 60 °C,90%RH max For 96hrs under no-load condition excluding the polarizer, Then taking it out and drying it at normal temperature.	60°C,90%RH 96hrs	1,2
Thermal shock resistance	The sample should be allowed stand the following 10 cycles of operation 	-30°C/80°C 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.

13.Initial Code For Reference

```
void Initial_code()
```

```
{
```

```
    Write_Command(0xae);
```

```
        Write_Data(0xa5);
```

```
    Write_Command(0x61);
```

```
        Write_Data(0x8f);
```

```
        Write_Data(0x04);
```

```
        Write_Data(0xa5);
```

```
        Write_Data(0xa5);
```

```
    Write_Command(0x62);
```

```
        Write_Data(0x42);
```

```
        Write_Data(0x0b);
```

```
        Write_Data(0x0c);
```

```
        Write_Data(0xa5);
```

```
    Write_Command(0x33);
```

```
        Write_Data(0x07);
```

```
        Write_Data(0x2c);
```

```
        Write_Data(0x09);
```

```
        Write_Data(0x2a);
```

```
    Write_Command(0x63);
```

```
        Write_Data(0x09);
```

```
        Write_Data(0x17);
```

```
        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(0x00);
Write_Data(0xa5);
Write_Data(0xa5);
Write_Data(0xa5);

Write_Command(0x91);
Write_Data(0x00);
Write_Data(0x17);
Write_Data(0x1b);
Write_Data(0x1d);

Write_Command(0x92);
Write_Data(0x1f);
Write_Data(0x21);
Write_Data(0x23);
Write_Data(0x25);

Write_Command(0x93);
Write_Data(0x27);
Write_Data(0x29);
Write_Data(0x2a);
Write_Data(0x2c);

Write_Command(0x94);
Write_Data(0x2e);
Write_Data(0x31);
Write_Data(0x34);
Write_Data(0x3f);

Write_Command(0x99);
Write_Data(0x00);
Write_Data(0x17);
Write_Data(0x1b);
Write_Data(0x1d);



```
Write_Command(0x9a);  
Write_Data(0x1f);  
Write_Data(0x21);  
Write_Data(0x23);  
Write_Data(0x25);
```

```
Write_Command(0x9b);  
Write_Data(0x27);  
Write_Data(0x29);  
Write_Data(0x2a);  
Write_Data(0x2c);
```

```
Write_Command(0x9c);  
Write_Data(0x2e);  
Write_Data(0x31);  
Write_Data(0x34);  
Write_Data(0x3f);
```

```
Write_Command(0x12);
```

```
Write_Data(0xa5);
```

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```
Write_Command(0x15);
```

```
Write_Data(0xa5);
```

```
}
```

