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MDT0700A0OSC-PAR	800 x 480	Parallel Interface	TFT Module
(MCT070WCA0C1W800480LML)	**Specification**		
Version: 1		Date: 09/03/2016	

Revision

1	09/03/2016	First issue

Display Features	
Display Size	7.0”
Resolution	800 x 480
Orientation	Landscape
Appearance	RGB
Logic Voltage	3.1V
Interface	Parallel
Brightness	300 cd/m^2
Touchscreen	CTP
Module Size	165.00 x 100.00 x 13.13mm
Operating Temperature	-20°C ~ +70°C
Pinout	36 way connector
Pitch	---

RoHS compliant

Box Quantity	Weight / Display
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* - For full design functionality, please use this specification in conjunction with the SSD1963 specification.(Provided Separately)

Display Accessories

Part Number	Description
MDIB-RPI	The MDIB-RPI is a Raspberry Pi interface board designed to provide connectivity and compatibility to a range of MIDAS TFT displays.

Optional Variants

Appearances	Voltage

Summary

This technical specification applies to 7.0’ color TFT-LCD panel. The 7.0’ color 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.

General Specification

- Size: 7.0 inch
- Dot Matrix: 800 x RGB x 480(TFT) dots
- Module dimension: 165.0(W) x 100.0(H) x 13.13(D) mm
- Active area: 154.08 x 85.92 mm
- Dot pitch: 0.0642 x 0.179 mm
- LCD type: TFT, Normally White, Transmissive
- View Direction: 12 o’clock
- Gray Scale Inversion Direction: 6 o’clock
- Backlight Type: LED,Normally White
- Controller IC: SSD1963
- Interface: Digital 8080 family MPU 8bit/16bit
- CTP FW: 9
- With /Without TP: With CTP
- Surface: Glare

*Color tone slight changed by temperature and driving voltage.

Interface

LCM PIN Definition (CON2)

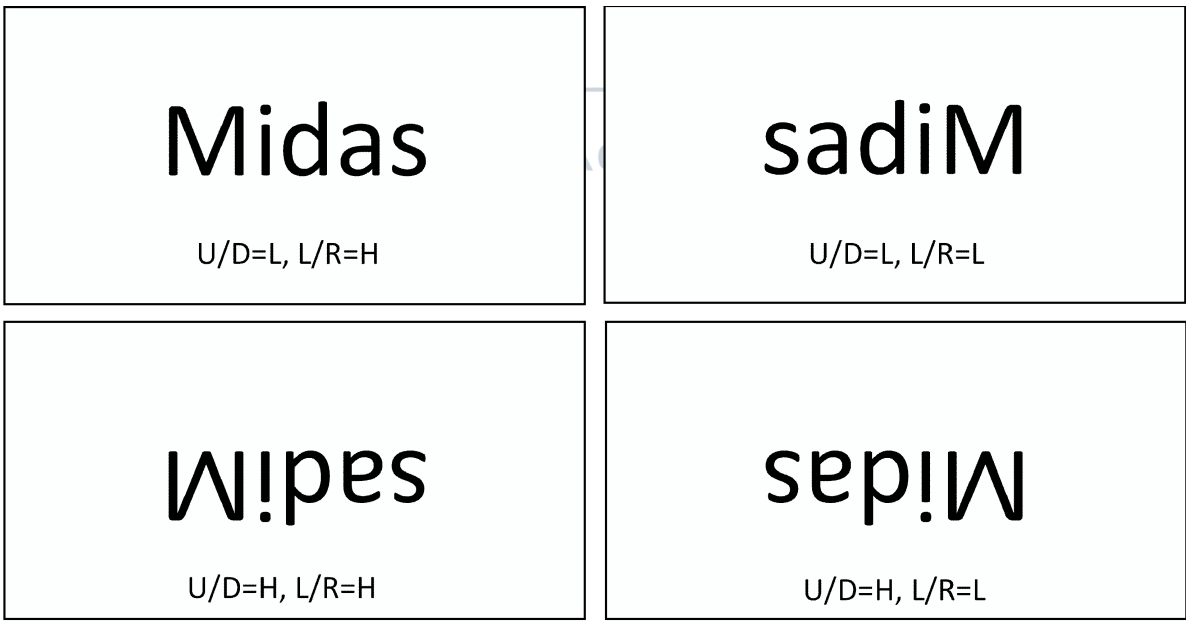
Pin	Symbol	Function	Remark
1	GND	System ground pin of the IC . Connect to system ground.	
2	VDD	Power Supply : +3.3V	
3	BLE	Backlight control signal , H: On \ L: Off	
4	D/C	Data/Command select	
5	WR	Write strobe signal	
6	RD	Read strobe signal	
7	DB0	Data bus	
8	DB1	Data bus	
9	DB2	Data bus	
10	DB3	Data bus	
11	DB4	Data bus	
12	DB5	Data bus	
13	DB6	Data bus	
14	DB7	Data bus	
15	DB8	Data bus (When select 8bits Mode, this pin is NC)	Note1
16	DB9	Data bus (When select 8bits Mode, this pin is NC)	Note1
17	DB10	Data bus (When select 8bits Mode, this pin is NC)	Note1
18	DB11	Data bus (When select 8bits Mode, this pin is NC)	Note1
19	DB12	Data bus (When select 8bits Mode, this pin is NC)	Note1
20	DB13	Data bus (When select 8bits Mode, this pin is NC)	Note1
21	DB14	Data bus (When select 8bits Mode, this pin is NC)	Note1
22	DB15	Data bus (When select 8bits Mode, this pin is NC)	Note1
23	NC	No connect	
24	CTP_INT	CTP_ External interrupt to the host	
25	CS	Chip select	
26	RST	Hardware reset	
27	L/R	Left / right selection; Default L/R=H	Note 2,3
28	U/D	Up/down selection; ; Default U/D=L	Note 2,3
29	CTP_SCL	CTP_SPI Slave mode, chip select, active low / I2C clock input	
30	CTP_SDA	CTP_ SPI Slave mode, data input / I2C data input and output	
31	CTP_RST	CTP_ External Reset, Low is active	
32	CTP_WAKE	CTP_External interrupt from the host	
33	VLED-	Power for LED Driver IC(GND)	
34	VLED-	Power for LED Driver IC(GND)	
35	VLED+	Power for LED Driver IC(+5V)	
36	VLED+	Power for LED Driver IC(+5V)	

Note1: When select 8bit mode, DB0~DB7 be used, DB8~DB15 no connect
When select 16bit mode, DB0~DB15 be used

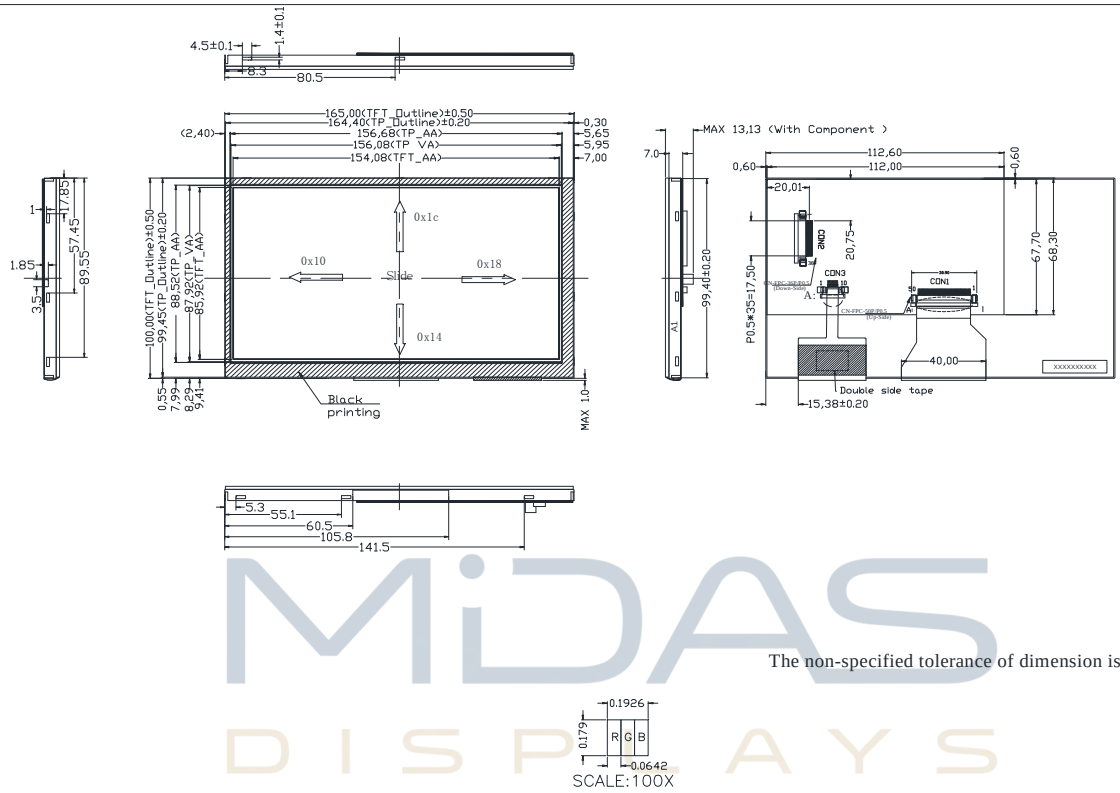
Note 2: Selection of scanning mode

Setting of scan control input		Scanning direction
U/D	L/R	
GND	VDD	Up to down, left to right
VDD	GND	Down to up, right to left
GND	GND	Up to down, right to left
VDD	VDD	Down to up, left to right

Note 3: Definition of scanning direction.Refer to the figure as below:



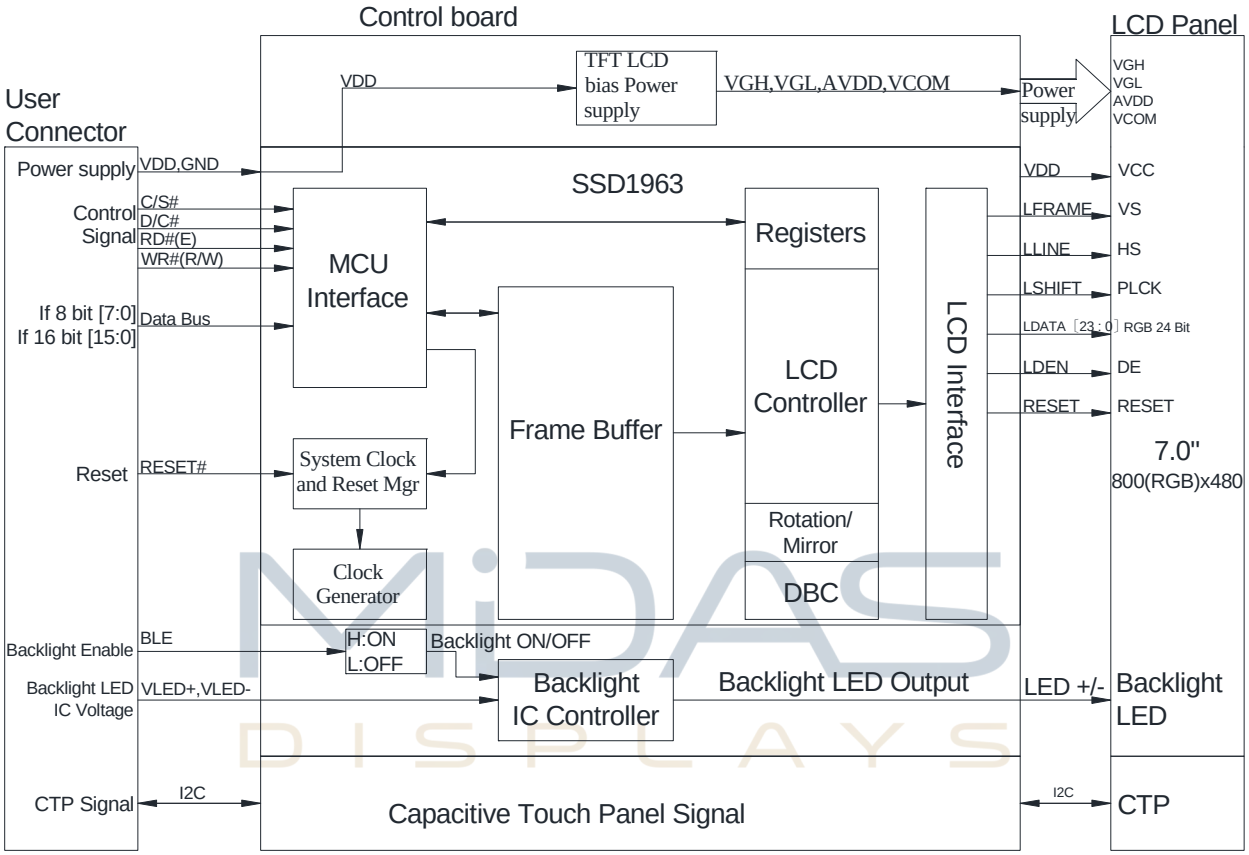
Contour Drawing



Pin	Symbol
1	GND
2	VDD
3	BLE
4	D/C
5	WR
6	RD
7	DB0
8	DB1
9	DB2
10	DB3
11	DB4
12	DB5
13	DB6
14	DB7
15	DB8
16	DB9
17	DB10
18	DB11
19	DB12
20	DB13
21	DB14
22	DB15
23	NC
24	CTP_INT
25	CS
26	RST
27	L/R
28	U/D
29	CTP_SCL
30	CTP_SDA
31	CTP_RST
32	CTP_WAKE
33	VLED-
34	VLED-
35	VLED+
36	VLED+

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

Block Diagram

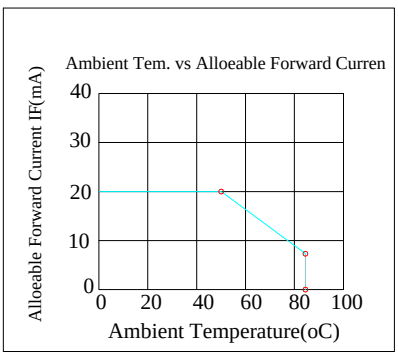


Absolute Maximum Ratings

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



Electrical Characteristics

Operating conditions: (CON2.Pin1=GND, Pin2=VDD)

Item	Symbol	Condition	Min	Typ	Max	Unit	Remark
Supply Voltage For LCM	VDD	—	3.0	3.1	3.3	V	—
Supply Current For LCM	IDD	—	—	310	460	mA	Note1

Note 1 : This value is test for VDD=3.3V , Ta=25 only

Backlight driving conditions (CON2.Pin33,34=VLED-, Pin35,36=VLED+)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Remark
Operation Current For LED Driver	VLED=5V	400	—	600	mA	Note 1,2
Power Consumption	VLED=5V	2000	—	3000	mW	Note 1,2
Supply Voltage For LED Driver	VLED+	—	5	—	V	—
LED Life Time	—	—	50,000	—	Hr	Note 2,3,4

Note 1 : Base on VLED= 5V for the back light driver IC specification
Note 2 : Ta = 25
Note 3 : Brightness to be decreased to 50% of the initial value
Note 4 : The single LED lamp case

DC CHARATERISTICS

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

Interface timing

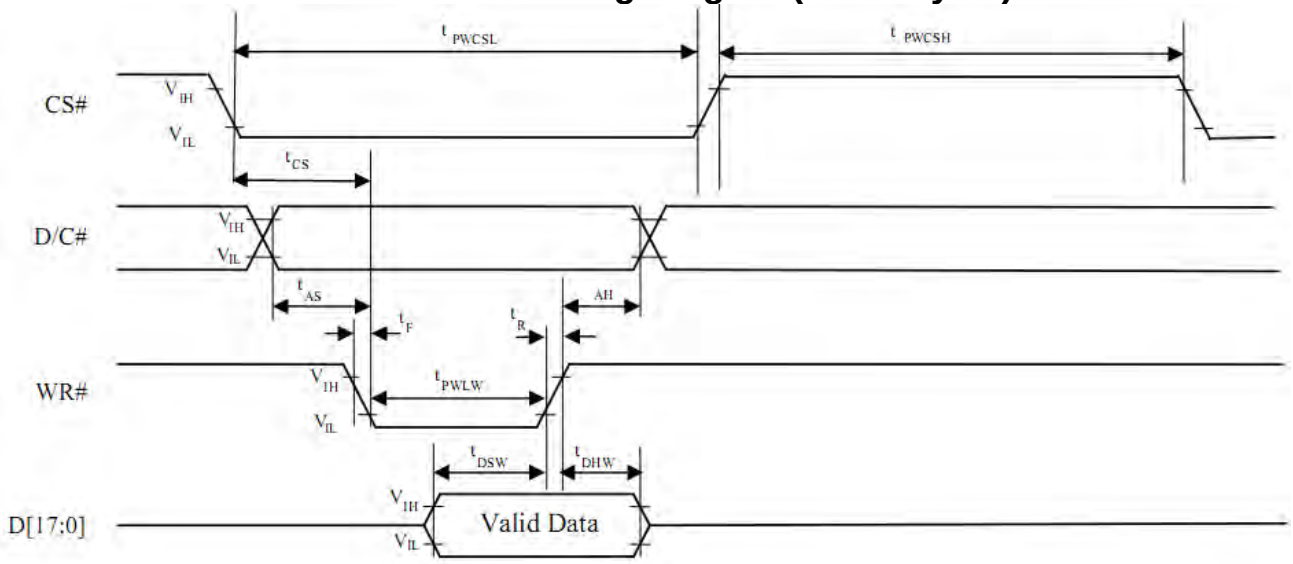
8080 Mode

The 8080 mode MCU interface consist of CS#, D/C#, RD#, WR#, Data Bus. This interface use WR# to define a write cycle and RD# for read cycle. If the WR# goes low when the CS# signal is low, the data or command will be latched into the system at the rising edge of WR#. Similarly, the read cycle will start when RD# goes low and end at the rising edge of RD#.

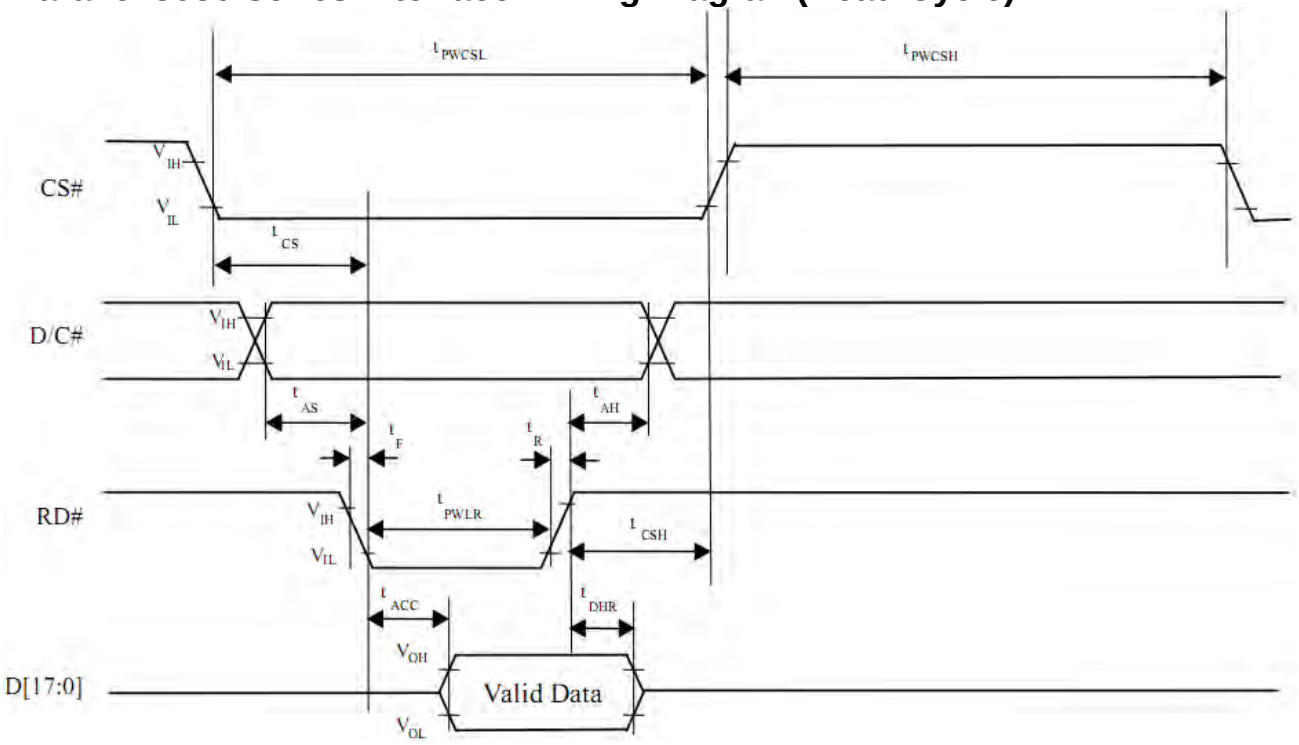
8080 Mode Write Cycle

Symbol	Parameter	Min	Typ	Max	Unit
fMCLK	System Clock Frequency	1	-	110	MHz
tMCLK	System Clock Period	1/ fMCLK	-	-	ns
tPWCSH	Control Pulse High Width Write Read	13 30	1.5* **t**MCLK 3.5* **t**MCLK	-	ns
tPWCSL	Control Pulse Low Width Write (next write cycle) Write (next read cycle) Read	13 80 80	1.5* **t**MCLK 9* **t**MCLK 9* **t**MCLK	-	ns
tAS	Address Setup Time	1	-	-	ns
tAH	Address Hold Time	2	-	-	ns
tDSW	Write Data Setup Time	4			ns
tDHW	Write Data Hold Time	1	-	-	ns
tPWLW	Write Low Time	12			ns
tDHR	Read Data Hold Time	1	-	-	ns
tACC	Access Time	32			ns
tPWLR	Read Low Time	36	-	-	ns
tR	Rise Time	-		0.5	ns
tF	Fall Time	-	-	0.5	ns
tCS	Chip select setup time	2	-	-	ns
tCSH	Chip select hold time to read signal	3	-	-	ns

Parallel 8080-series Interface Timing Diagram(Write Cycle)



Parallel 8080-series Interface Timing Diagram(Read Cycle)



Pixel Data Format

Interface	Cycle	D[15]	D[14]	D[13]	D[12]	D[11]	D[10]	D[9]	D[8]	D[7]	D[6]	D[5]	D[4]	D[3]	D[2]	D[1]	D[0]
16 bits (565 format)	1st	R5	R4	R3	R2	R1	G5	G4	G3	G2	G1	G0	B5	B4	B3	B2	B1
16 bits	1st	R7	R6	R5	R4	R3	R2	R1	R0	G7	G6	G5	G4	G3	G2	G1	G0
	2nd	B7	B6	B5	B4	B3	B2	B1	B0	R7	R6	R5	R4	R3	R2	R1	R0
	3rd	G7	G6	G5	G4	G3	G2	G1	G0	B7	B6	B5	B4	B3	B2	B1	B0
8 bits	1st									R7	R6	R5	R4	R3	R2	R1	R0
	2nd									G7	G6	G5	G4	G3	G2	G1	G0
	3rd									B7	B6	B5	B4	B3	B2	B1	B0

Optical Characteristics

Item		Symbol	Condition.	Min	Typ.	Max.	Unit	Remark
Response time		Tr	θ=0°、Φ=0°	-	10	20	.ms	Note 3
		Tf		-	15	30	.ms	
Contrast ratio		CR	At optimized viewing angle	400	500	-	-	Note 4
Color Chromaticity	White	Wx	θ=0°、Φ=0	0.26	0.31	0.36		Note 2,5,6
		Wy		0.28	0.33	0.38		
Viewing angle (Gray Scale Inversion Direction)	Hor.	ΘR	CR≧10	-	75	-	Deg.	Note 1
		ΘL		-	75	-		
	Ver.	ΦT		-	75	-		
		ΦB		-	75	-		
Brightness		-	-	200	300	-	cd/m^2	Center of display

Ta=25±2℃, V_{LED} / I_{LED}= 5V / 400mA

Note 1: Definition of viewing angle range

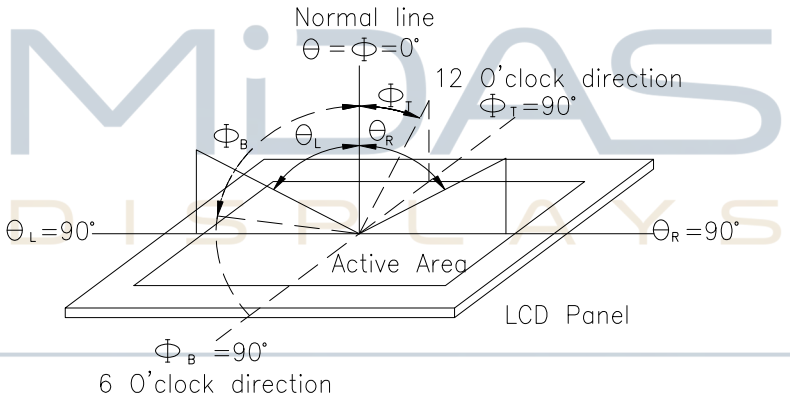


Fig. 11.1. Definition of viewing angle

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 or BM-5 luminance meter 1.0° field of view at a distance of 50cm and normal direction.

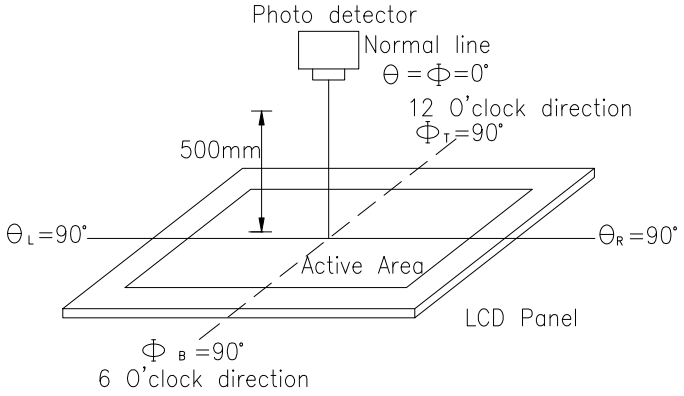
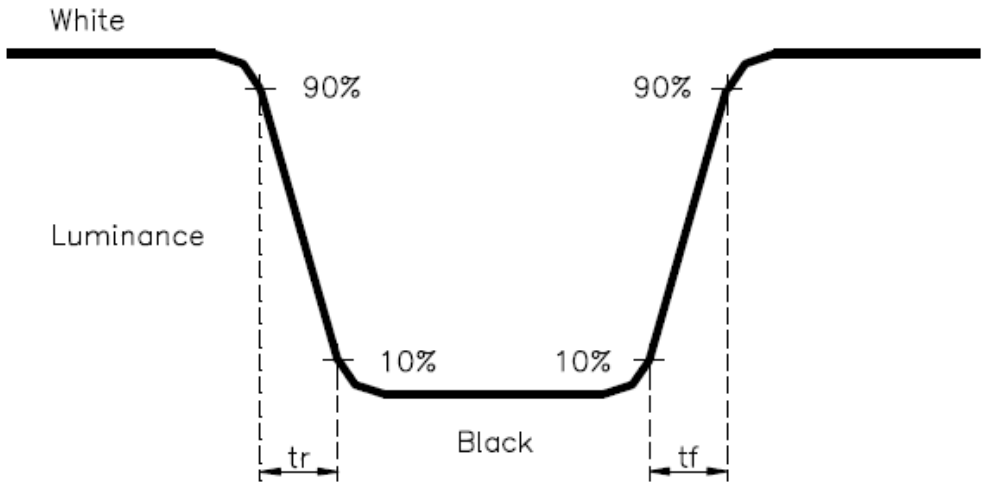


Fig.11.2. Optical measurement system setup

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.

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

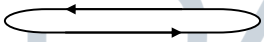
Note 5: White Vi = Vi50 ± 1.5V
Black Vi = Vi50 ± 2.0V
"±" means that the analog input signal swings in phase with VCOM signal.
"±" means that the analog input signal swings out of phase with VCOM signal.
The 100% transmission is defined as the transmission of LCD panel when all the input terminals of module are electrically opened.

Note 6: Definition of color chromaticity (CIE 1931)
Color coordinates measured at the center point of LCD

Note 7: Measured at the center area of the panel when all the input terminals of LCD panel are electrically opened.

Reliability

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

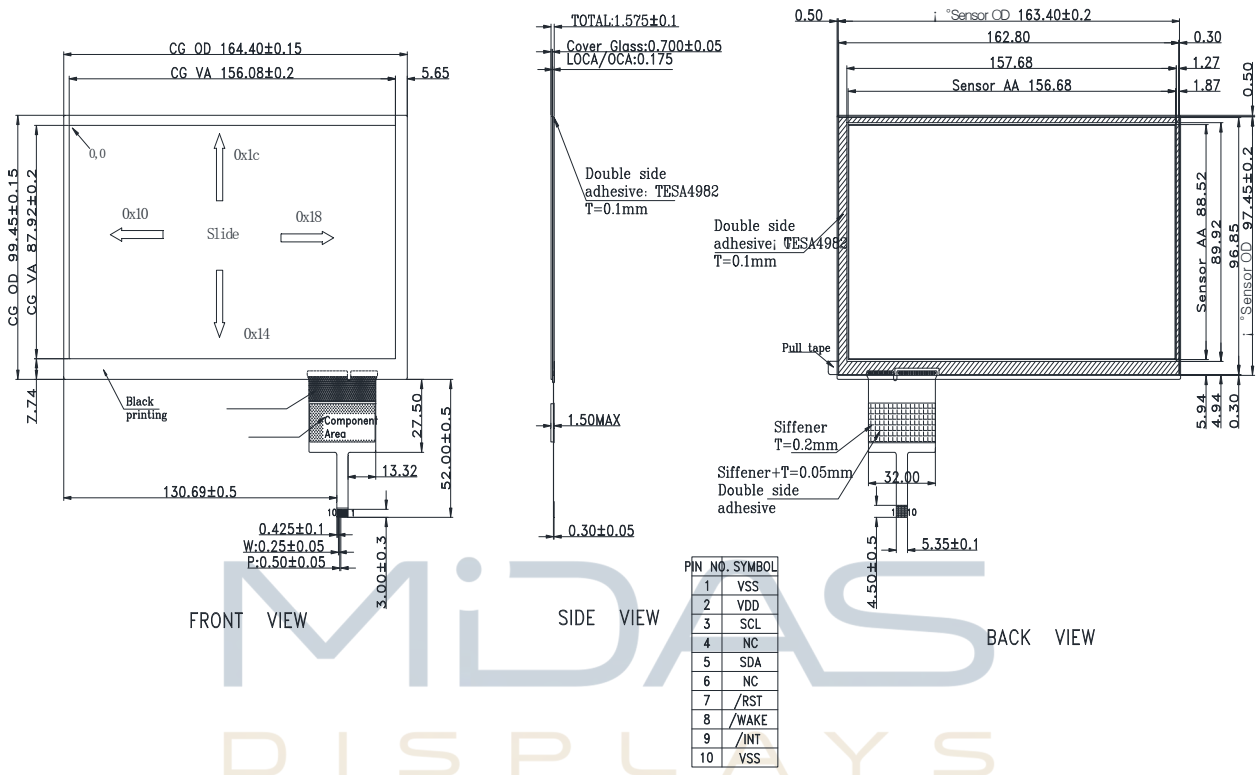
Environmental Test			
Test Item	**Content of Test**	**Test Condition**	**Note**
High Temperature storage	Endurance test applying the high storage temperature for a long time.	80 200hrs	2
Low Temperature storage	Endurance test applying the low storage temperature for a long time.	-30 200hrs	1,2
High Temperature 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	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 : 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=±600V(contact) ,±800v(air), RS=330Ω CS=150pF 10 times	——

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.

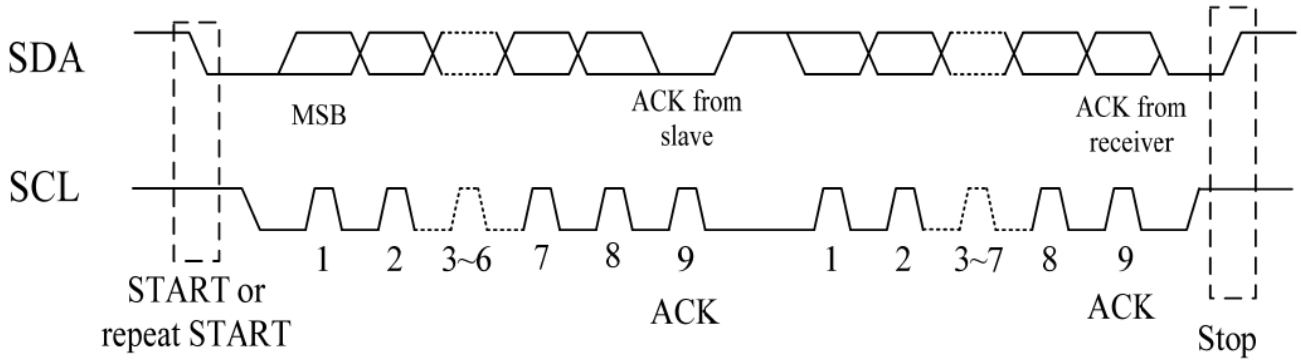
Note3: The packing have to including into the vibration testing.

Touch Panel Information

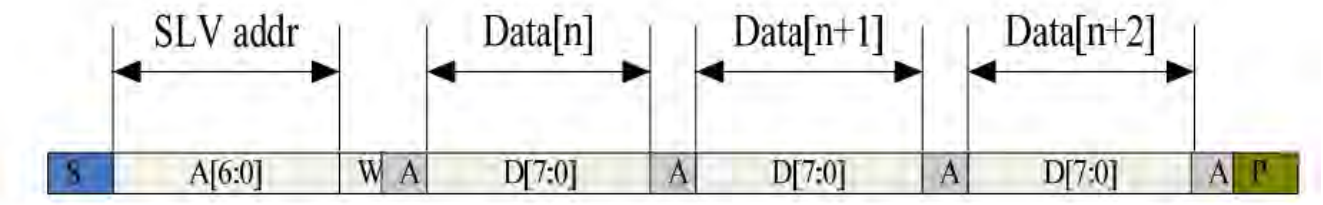


PIN NO.	SYMBOL
1	VSS
2	VDD
3	SCL
4	NC
5	SDA
6	NC
7	/RST
8	/WAKE
9	/INT
10	VSS

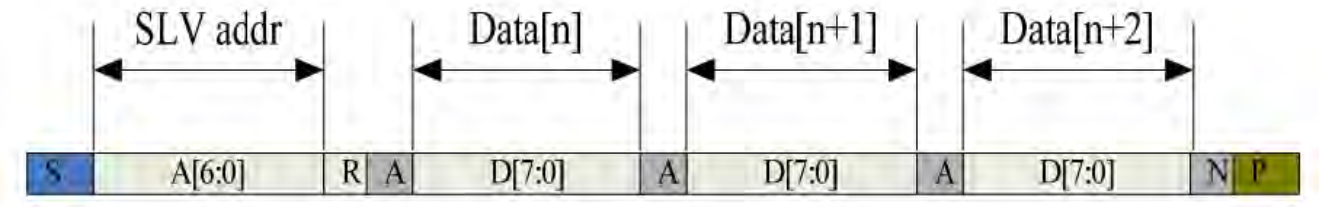
CTP I2C Timing:



I2C Serial Data Transfer Format



I2C master write, slave read



I2C master read, slave write

Mnemonics	Description
S	12C Start or 12C Restart
A[6:0]	Slave address A[6:4]:3'b011 A[3:0]:data bits are identical to those of 12CCON[7:4]register
W	1'b0:Write
R	1'b1:Read
A(N)	ACK(NACK)
P	STOP :the indication of the end of a packet(if this bit is missing, S will indicate the end of the current packet and beginning of the next packet)

Lists the meanings of the mnemonics used in the above figures

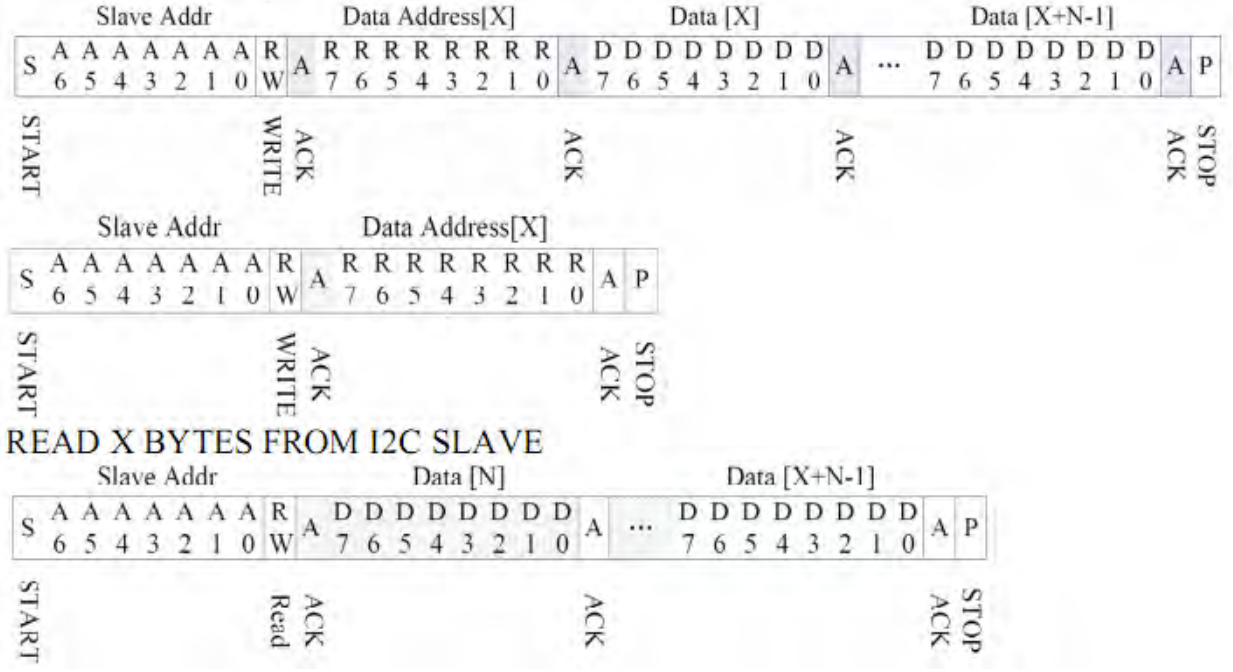
Parameter	Unit	Min	Max
SCL frequency	KHz	0	400
Bus free time between a STOP and START condition	us	4.7	\
Hold time (repeated) ST ART condition	us	4.0	\
Data setup time	ns	250	\
Setup time for a repeated START condition	us	4.7	\
Setup time for STOP condition	us	4.0	\

Interface Timing Characteristics

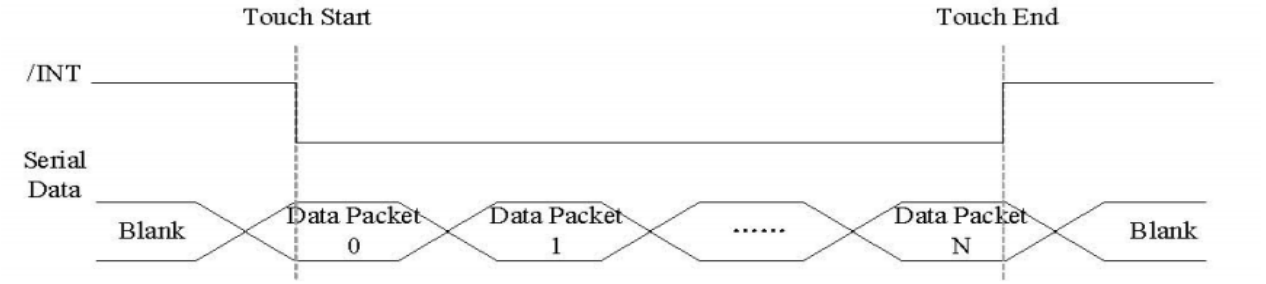
AS FOR STANDARD CTPM, HOST NEED TO USE BOTH INTERRUPT CONTROL SIGNAL AND SERIAL DATA INTERFACE TO GET THE TOUCH DATA.

HERE IS THE TIMING TO GET TOUCH DATA.

13.2. WRITE BYTES TO I2C SLAVE



AS FOR STANDARD CTPM, HOST NEED TO USE BOTH INTERRUPT CONTROL SIGNAL AND SERIAL DATA INTERFACE TO GET THE TOUCH DATA, HERE IS THE TIMING TO GET TOUCH DATA.



Address: 0X38

TOUCH DATA READ PROTOCOL

NAME	VALUE	DESCRIPTION
START CH	0X00	START COMMAND FOR CTPM TOUCH DATA PACKET,HOST MUST SEND CTPM A START CH COMMAND BEFORE READ TOUCH DATA
lst READ BYTE～ LAST READ BYTE		TOUCH DATA PACKET SENT BY CTPM,EACH BYTE HAS 8-BIT DATA ,A TOUCH DATA PACKET CONSISTS OF N BYTE

A DATA PACKET STARTS WITH A HEADER AND ENDS WITH CRC CODE,AS FOR 5 POINTS DATA PACKET,THE LENGTH OF THE PACKET IS ALWAYS 26 BYTES IN SPITE OF ACTUAL TOUCH POINTS.

Address	Name	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0	Host Access
00h	Devide__Mode		Device Model[2:0]							RW
01h	Gest__ID	Gesture ID[7:0]								R
02h	TD__Status					Number of touch points[3:0]				R
03h	Touch1__XH	1st Event Flag				1st Touch X Position[11:8]				R
04h	Touch1__XL	1st Touch X Position[7:0]								R
05h	Touch1__YH	1st Touch ID[3:0]				1st Touch Y Position[11:8]				R
06h	Touch1__YL	1st Touch Y Position[7:0]								R
09h	Touch2__XH	2nd Event Flag				2nd Touch X Position[11:8]				R

0Ah	Touch2__XL	2nd Touch X Position[7:0]		R
0Bh	Touch2__YH	2nd Touch ID[3:0]	2ndTouch Y Position[11:8]	R
0Ch	Touch2__YL	2nd Touch Y Position[7:0]		R
0Fh	Touch3__XH	3rdEvent Flag	3rdTouch X Position[11:8]	R
10h	Touch3__XL	3rd Touch X Position[7:0]		R
11h	Touch3__YH	3rdTouch ID[3:0]	3rdTouch Y Position[11:8]	R
12h	Touch3__YL	3rd Touch Y Position[7:0]		R
15h	Touch4__XH	4thEvent Flag	4thTouch X Position[11:8]	R
16h	Touch4__XL	4th Touch X Position[7:0]		R
17h	Touch4__YH	4thTouch ID[3:0]	4thTouch Y Position[11:8]	R
18h	Touch4__YL	4th Touch Y Position[7:0]		R
1Bh	Touch5__XH	5thEvent Flag	5thTouch X Position[11:8]	R
1Ch	Touch5__XL	5th Touch X Position[7:0]		R
1Dh	Touch5__YH	5thTouch ID[3:0]	5thTouch Y Position[11:8]	R
1Eh	Touch5__YL	5th Touch Y Position[7:0]		R

Initial Code For Reference

```
void Initial_SSD1963()
{

        Write_Command(0x01);
        Delay_ms(10);
        Write_Command(0xe0);     //START PLL
        Write_Parameter(0x01);
        Delay_ms(50);
        Write_Command(0xe0);     //START PLL
        Write_Parameter(0x03);
        Delay_ms(5);

        Write_Command(0xb0);
        Write_Parameter(0x20);
        Write_Parameter(0x80);
        Write_Parameter(0x03);
        Write_Parameter(0x1f);
        Write_Parameter(0x01);
        Write_Parameter(0xdf);
        Write_Parameter(0x00);

        Write_Command(0xf0);
        Write_Parameter(0x03); //pixel data format, 0x03 is 16bit(565 format);0x00 is for 8-bit

        //Set the MN of PLL
        Write_Command(0xe2);
        Write_Parameter(0x1d);
        Write_Parameter(0x02);
        Write_Parameter(0x54);

        Write_Command(0xe6);
        Write_Parameter(0x04);
        Write_Parameter(0x6f);
        Write_Parameter(0x47);

        //Set front porch and back porch
        Write_Command(0xb4);
        Write_Parameter(0x04);
        Write_Parameter(0x20);
        Write_Parameter(0x00);
        Write_Parameter(0x2e);
        Write_Parameter(0xd2);
        Write_Parameter(0x00);
        Write_Parameter(0x00);
        Write_Parameter(0x00);

        Write_Command(0xb6);
```

```
    Write_Parameter(0x02);
    Write_Parameter(0x0d);
    Write_Parameter(0x00);
    Write_Parameter(0x17);
    Write_Parameter(0x16);
    Write_Parameter(0x00);
    Write_Parameter(0x00);

  Write_Command(0x2a);
  Write_Parameter(0x00);
  Write_Parameter(0x00);
  Write_Parameter(0x03);
  Write_Parameter(0x1f);

  Write_Command(0x2b);
  Write_Parameter(0x00);
  Write_Parameter(0x00);
  Write_Parameter(0x01);
  Write_Parameter(0x1f);

    Write_Command(0xb8);
    Write_Parameter(0x0f);
    Write_Parameter(0x01);
    Write_Command(0xba);
    Write_Parameter(0x01);

    Write_Command(0x29);
    Write_Command(0x2c);
}
```