

| Specification | | | |
|----------------------|---------------------|------------------|-------------|
| Part Number: | MCT035AB0W320240LML | | |
| Version: | 1 | | |
| Date: | 2016/03/17 | | |
| Revision | | | |
| VERSION DA | TE | REVISED PAGE NO. | Note |
| 0 | 2016/03/16 | | First issue |

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| | |
|-----------------------|-----------------------|
| Display Size | 3.5" |
| Resolution | 320 x 240 |
| VGA Size | QVGA |
| Orientation | Landscape |
| Appearance | RGB |
| Logic Voltage | 3.1V |
| Interface | Parallel |
| Brightness | 300 cd/m ² |
| Touchscreen | N/A |
| Module Size W x H x D | 93.5 x 66.44 x 7.3 mm |
| Operating Temperature | -20°C ~ +70°C |
| Pin Out | 36 - Way |



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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

- 1 = **MC:** Midas Components
- 2 = **T:** TFTA: Active Matrix OLED **M:** Monitor
- 3 = **Size**
- 4 = **Series**
- 5 = **Viewing Angle:** 6: 6 O'clock 12: 12 O'clock O: All Round Viewing Angle
- 6 = **Blank:** No Touch **T:** Resistive Touchscreen **C:** Capacitive Touchscreen
- 7 = **Operating Temp Range:** **S:** 0+50Deg C **B:** -20+60Deg C
W: -20+70Deg C **E:** -30+85Deg C
X: -30+80Deg 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 (E-Tech)
- 13 = **Blank:** None **OB:** Optically Bonded **IPS:** In-plane switching



2.Summary

This technical specification applies to 3.45' color TFT-LCD panel. The 3.45' 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.



3. General Specifications

- Size: 3.5 inch
- Dot Matrix: 320 x RGBx240(TFT)
- Module dimension: 93.5 x 66.44 x 7.3 mm
- Active area: 70.08 x 52.56 mm
- Dot pitch: 0.073 x 0.219 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
- With /Without TP: Without TP
- Surface: Anti-Glare

*Color tone slight changed by temperature and driving voltage.



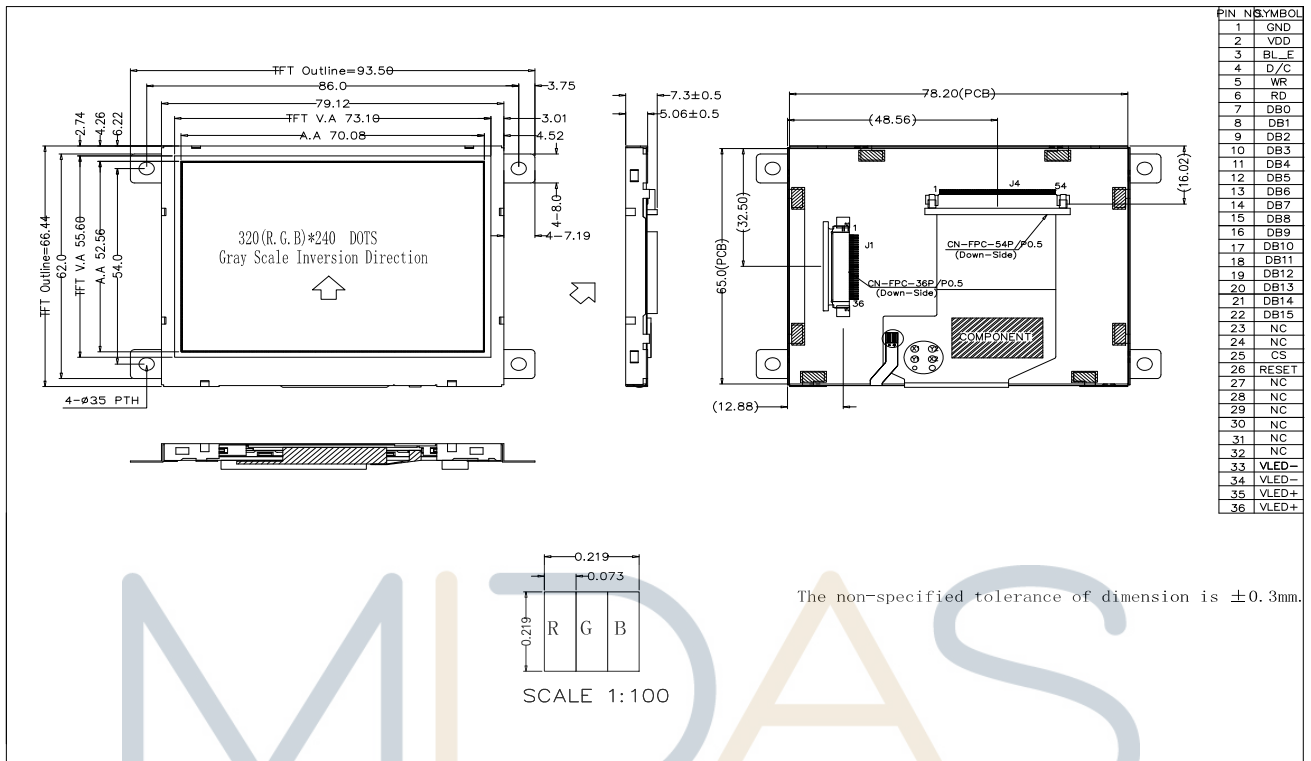
4.Interface

4.1. LCM PIN Definition (CON2)

| Pin S | ymbol | Function | Remark |
|-------|-------|---|--------|
| 1 | GND | System ground pin of the IC. Connect to system ground. | |
| 2 | VDD | Power Supply : +3.3V | |
| 3 | BL_E | 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 | NC | No connect | |
| 25 | CS | Chip select | |
| 26 | RESET | Hardware reset | |
| 27 | NC | No connect | |
| 28 | NC | No connect | |
| 29 | NC | No connect | |
| 30 | NC | No connect | |
| 31 | NC | No connect | |
| 32 | NC | No connect | |
| 33 | VLED- | VLED- for B/L LED inverter (GND) | |
| 34 | VLED- | VLED- for B/L LED inverter (GND) | |
| 35 | VLED+ | VLED+ for B/L LED inverter (+3.3V) | |
| 36 | VLED+ | VLED+ for B/L LED inverter (+3.3V) | |

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

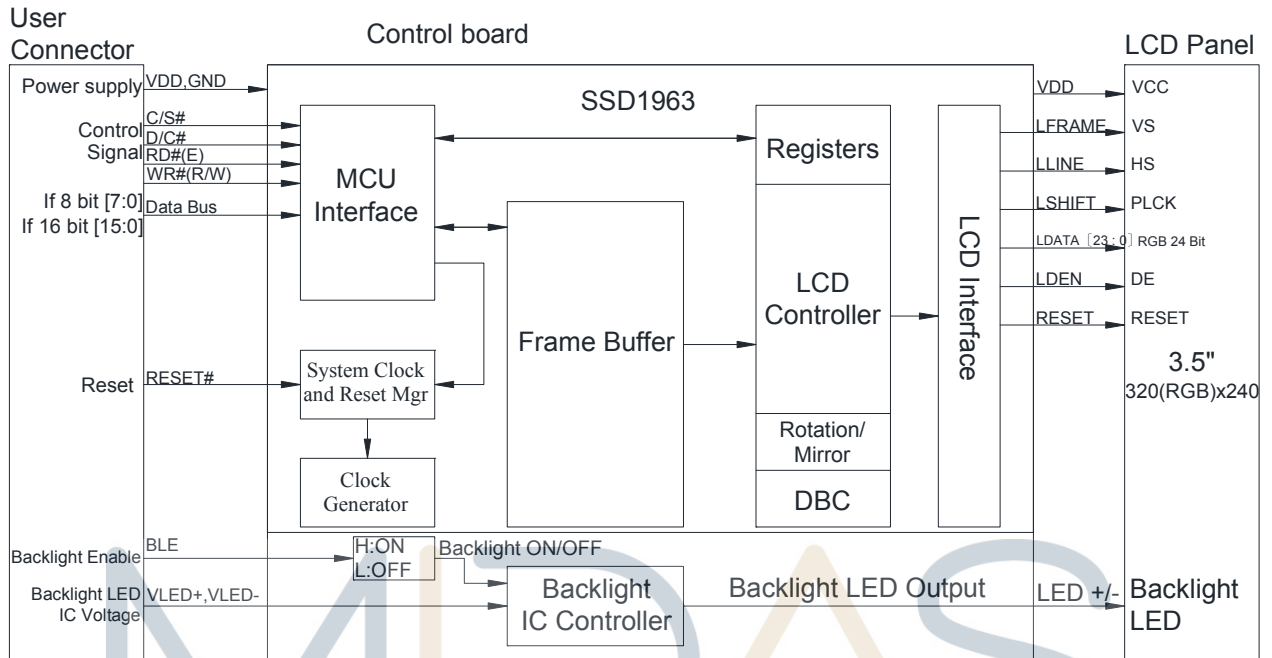
5. Contour Drawing



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6. Block Diagram



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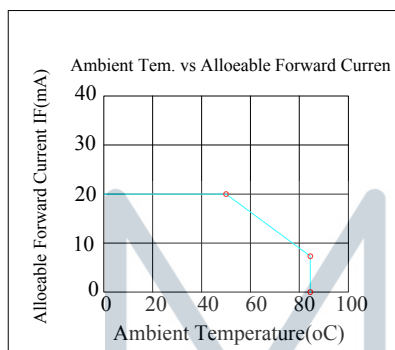


7. Absolute Maximum Ratings

| Item Sy | mbol | 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

- 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: (CON2.Pin1=GND, Pin2=VDD)

| Item Sy | mbol | Condition | Min | Typ | Max | Unit | Remark |
|------------------------|------|-----------|-----|-----|-----|------|--------|
| Supply Voltage For LCM | VDD | — | 3.0 | 3.1 | 3.3 | V | - |
| Supply Current For LCM | IDD | — | — | 200 | 300 | mA | Note1 |

Note 1 : This value is test for VDD=3.1V , Ta=25□ only

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

| Parameter | Symbol | Min. | Typ. | Max. | Unit | Remark |
|----------------------------------|-----------|------|--------|-------|------|------------|
| Operation Current For LED Driver | VLED=3.3V | 150 | - | 225 | mA | Note 1,2 |
| Power Consumption | VLED=3.3V | 495 | - | 742.5 | mW | Note 1,2 |
| Supply Voltage For LED Driver | VLED+ | 3.3 | - | 5 | V | Note 1,2 |
| LED Life Time | | - | 50,000 | - | Hr | Note 2,3,4 |

Note 1 : Base on VLED= 3.3V 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

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9.DC CHARATERISTICS

| Parameter Sy | mbol | Rating | | | Unit | Cond ition |
|--------------------------|----------|--------|----|--------|------|------------|
| | | Min T | yp | 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. Interface timing

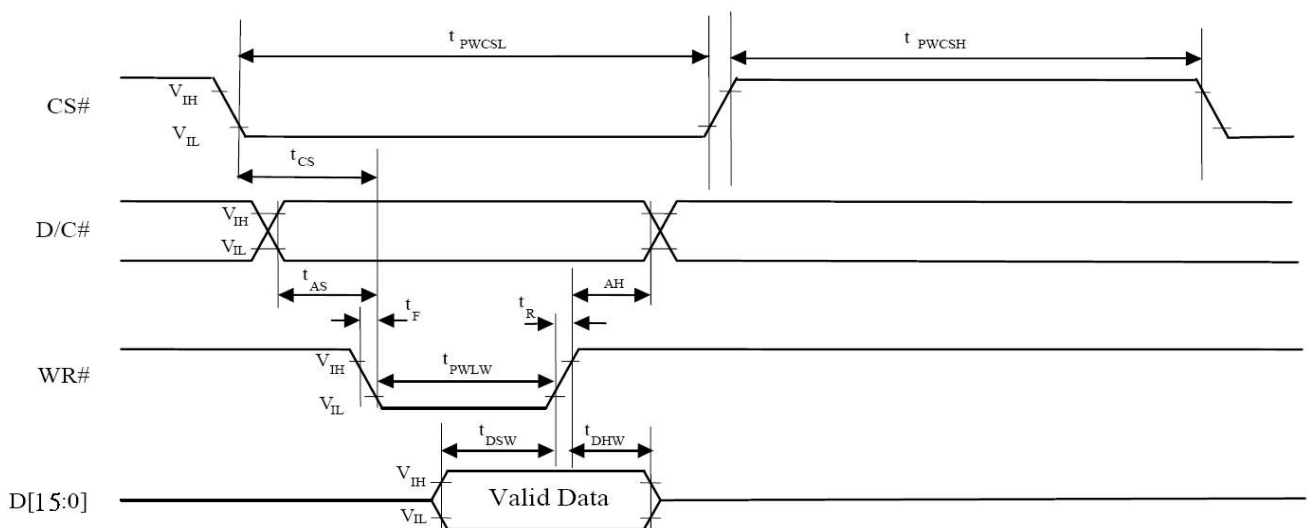
10.1. 8080 Mode

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#.

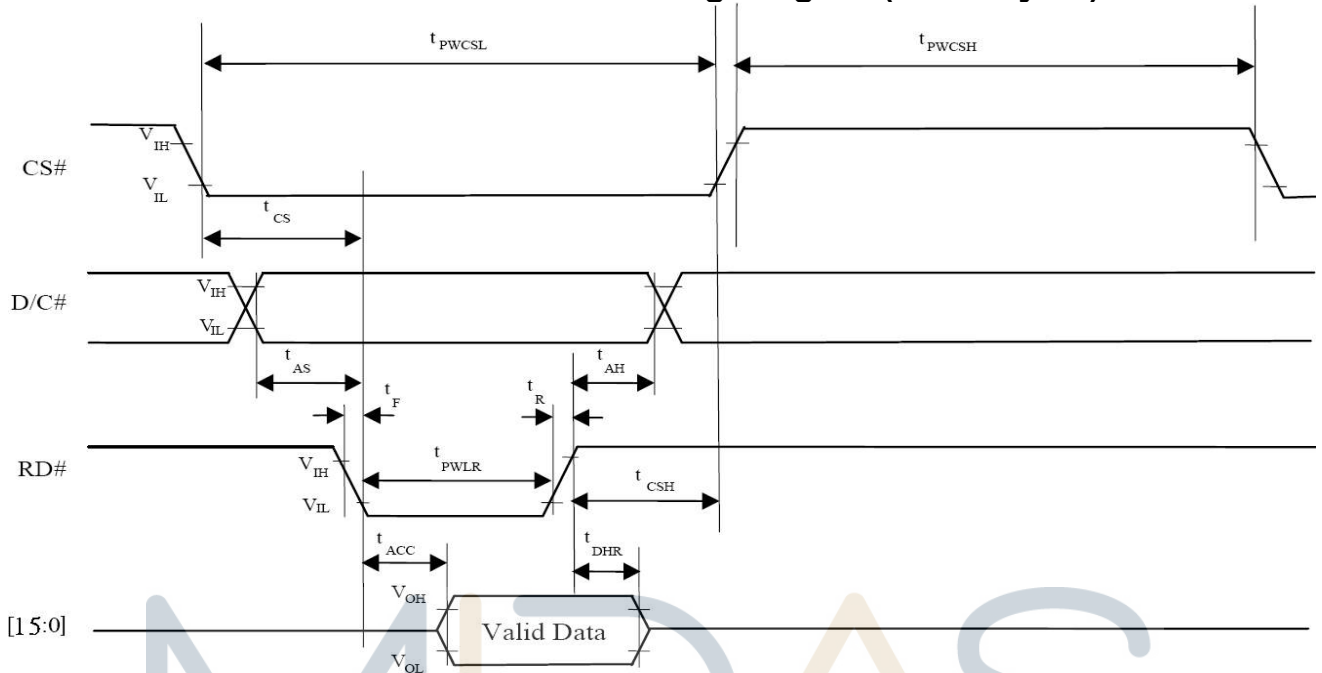
10.2. 8080 Mode Write Cycle

| 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* tMCLK 3.5* tMCLK | - | ns |
| tPWCSL | Control Pulse Low Width Write (next write cycle) Write (next read cycle) Read | 13 80 80 | 1.5* tMCLK 9* tMCLK 9* tMCLK | - | 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 |

10.3. Parallel 8080-series Interface Timing Diagram(Write Cycle)



10.4. Parallel 8080-series Interface Timing Diagram(Read Cycle)



10.5. 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) | 1 st | R5 | R4 | R3 | R2 | R1 | G5 | G4 | G3 | G2 | G1 | G0 | B5 | B4 | B3 | B2 | B1 |
| | 1 st | R7 | R6 | R5 | R4 | R3 | R2 | R1 | R0 | G7 | G6 | G5 | G4 | G3 | G2 | G1 | G0 |
| | 2 nd | B7 | B6 | B5 | B4 | B3 | B2 | B1 | B0 | R7 | R6 | R5 | R4 | R3 | R2 | R1 | R0 |
| 16 bits | 3 rd | G7 | G6 | G5 | G4 | G3 | G2 | G1 | G0 | B7 | B6 | B5 | B4 | B3 | B2 | B1 | B0 |
| | 1 st | | | | | | | | | R7 | R6 | R5 | R4 | R3 | R2 | R1 | R0 |
| | 2 nd | | | | | | | | | G7 | G6 | G5 | G4 | G3 | G2 | G1 | G0 |
| 8 bits | 3 rd | | | | | | | | | B7 | B6 | B5 | B4 | B3 | B2 | B1 | B0 |

11. Optical Characteristics

| Item | Symbol | Condition. | Min | Typ. | Max. | Unit | Remark | |
|---|--------|--------------------------------|------------|------|------|-------------------|-------------------|------------|
| Response time | T_r | $\theta=0^\circ, \phi=0^\circ$ | - | 10 | | ms | Note 3,5 | |
| | T_f | | - | 15 | | ms | | |
| Contrast ratio | CR | At optimized viewing angle | 300 | 350 | - | - | Note 4,5 | |
| Color Chromaticity | White | $\theta=0^\circ, \phi=0^\circ$ | W_x | 0.26 | 0.31 | 0.36 | - | Note 2,6,7 |
| | | | W_y | 0.28 | 0.33 | 0.38 | - | |
| Viewing angle (Gray Scale Inversion Direction) | Hor. | $CR \geq 10$ | θ_R | - | 75 | - | Deg. | Note 1 |
| | | | θ_L | - | 75 | - | | |
| | Ver. | | ϕ_T | - | 75 | - | | |
| | | | ϕ_B | - | 75 | - | | |
| Brightness | - | - | 250 | 300 | - | cd/m ² | Center of display | |

$T_a=25\pm 2^\circ\text{C}$, VLED /ILED = 3.3V /150mA

Note 1: Definition of viewing angle range

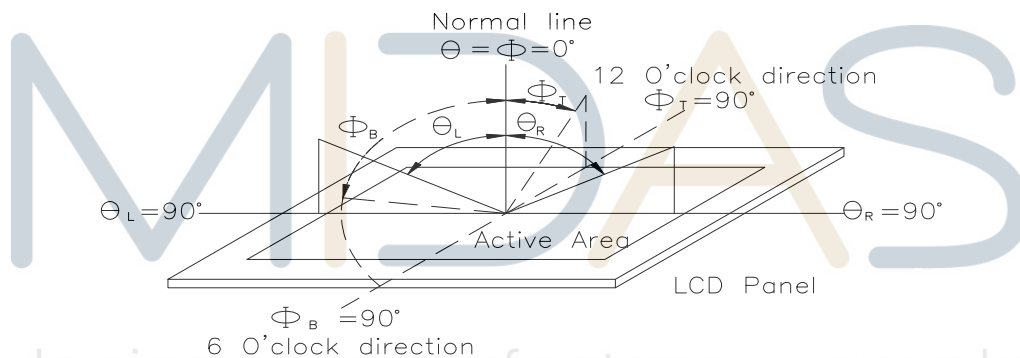


Fig. 11.1. Definition of viewing angle

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.

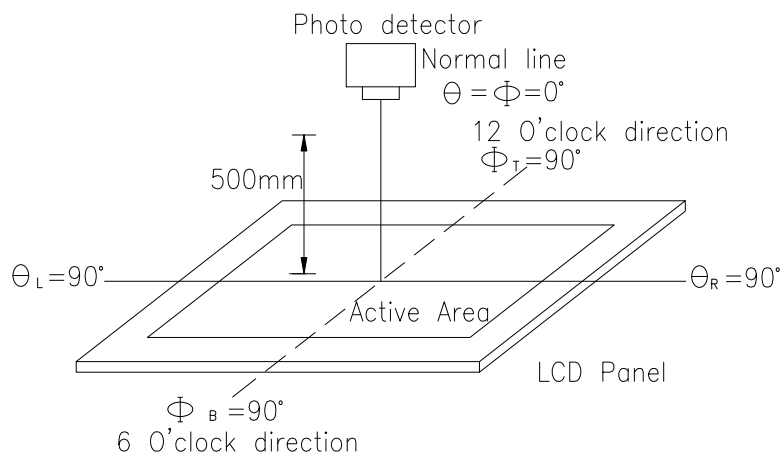
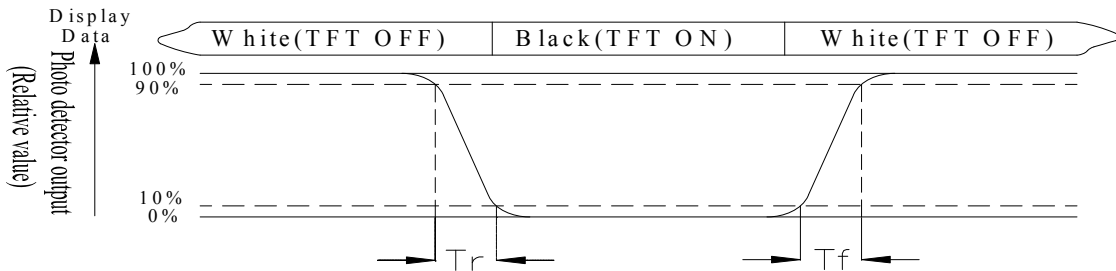


Fig. 11.2. Optical measurement system setup

Note 3: Definition of Response time:

The response time is defined as the LCD optical switching time interval between “White” state and “Black” state. Rise time, T_r , is the time between photo detector output intensity changed from 90% to 10%. And fall time, T_f , is the time between photo detector output intensity changed from 10% to 90%



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 $V_i = V_{i50} \pm 1.5V$

Black $V_i = V_{i50} \pm 2.0V$

“±” 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.

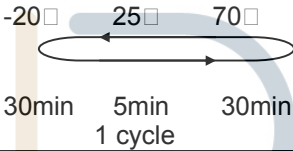
Note 6: Definition of color chromaticity (CIE 1931)

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.

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 | 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 : 3 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.

13.PACKAGE SPECIFICATION

| | | | | | |
|--------------------|------------|---|----------------|--------------|----------------|
| LCM Model | MCT035AB0W | LCM 包裝規格書 LCM Packaging Specifications | Approve | Check | Contact |
| Drawing NO. | | | DATE | 初版 | 版次 Ver |
| | | | 02/05/14' | 02/05/14' | 0 |

1.包裝材料規格表 (Packaging Material) :(per carton)

| NO. | Item Model | Item Model | Dimensions | Quantity |
|-----|-----------------------|-----------------------|---------------|----------|
| 1 | 成品 (LCM) | MCT035AB0W320240LML | | 216 |
| 2 | TRAY 盤 (2) | PKCA1XXXXXXXXXXXX0355 | 315*265m m | 36 |
| 3 | BP01 內盒(3)Product Box | PK3Y1XXXXXXXXXXXX0001 | 332*280*100mm | 6 |
| 4 | 泡棉(4)Foam | ----- | | 6 |
| 5 | 外紙箱(5)Carton | PK4X1XXXXXXXXXXXX0000 | 565*340*320mm | 1 |
| 6 | | | | |
| 7 | | | | |
| 8 | | | | |
| 9 | | | | |

2.單箱數量規格表(Packaging Specifications and Quantity) :

(1)LCM quantity per box : no per tray 6 x no of tray 6 = 36

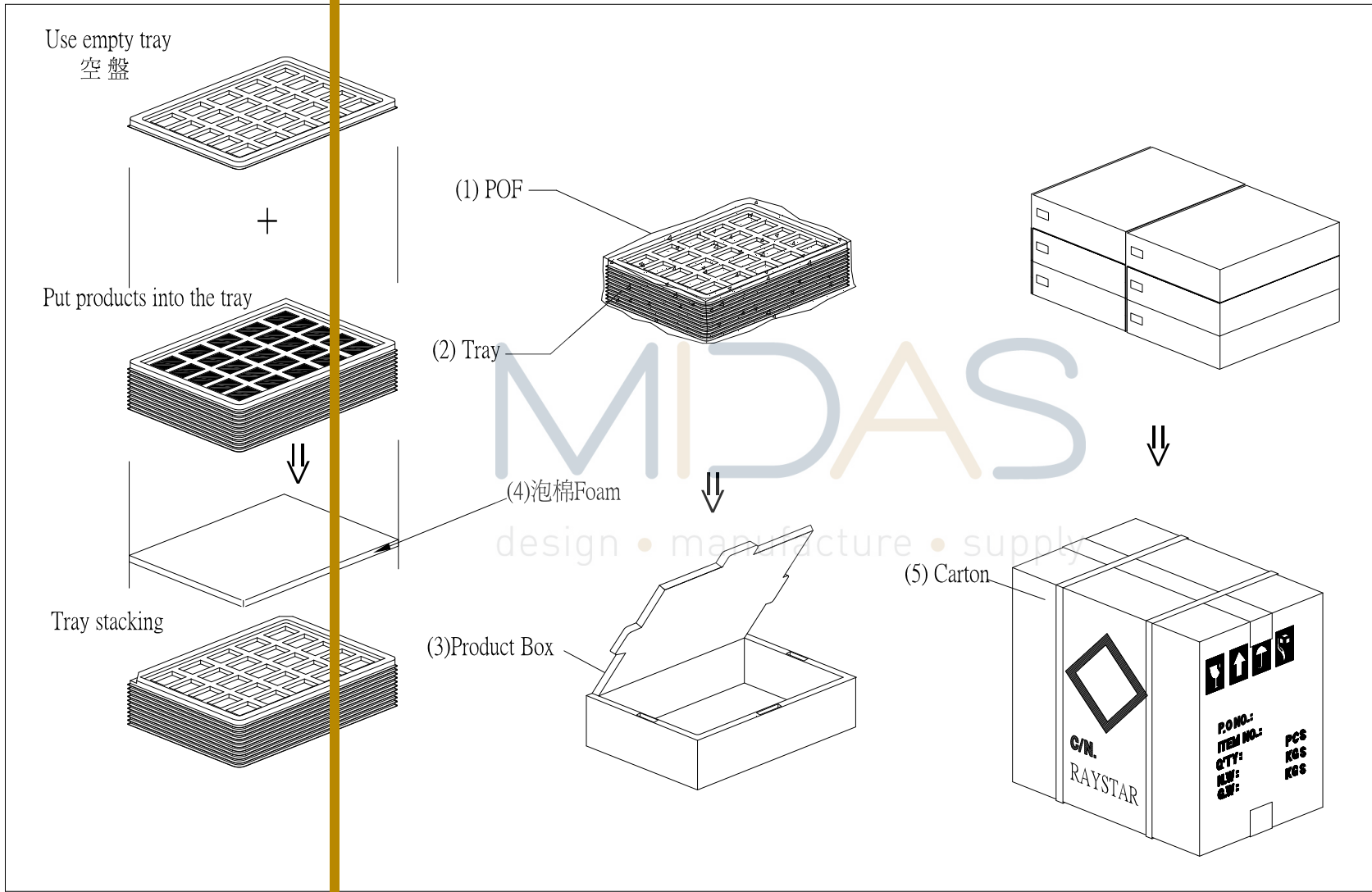
(2)Total LCM quantity in carton : quantity per box 36 x no of boxes 6 = 216

特 記 事 項 (REMARK)

1. Label Specifications :

| |
|-----------|
| MOOEL: |
| LOT NO : |
| QUANTITY: |
| CHECK: |





14.Initial Code For Reference

```
void Initial_code()
{
    Unsigned int SOURCE,GATE;
    SOURCE=320;
    GATE=240;

    Reset = 1;
    Delay_ms(10);
    Reset = 0;
    Delay_ms(50);
    Reset = 1;
    Delay_ms(100);

    Write_Command(0x01);
    Delay_ms(10);
    Write_Command(0xe0); //START PLL
    Write_Parameter(0x01);
    Delay_ms(50);
    Write_Command(0xe0); //LOCK PLL
    Write_Parameter(0x03);
    Delay_ms(5);
    Write_Command(0xb0);
    Write_Parameter(0x2C);
    Write_Parameter(0x80);
    Write_Parameter((SOURCE-1)>>8);
    Write_Parameter(SOURCE-1);
    Write_Parameter((GATE-1)>>8);
    Write_Parameter(GATE-1);
    Write_Parameter(0x00);
    Write_Command(0xf0);
    Write_Parameter(0x03); //0x03 is 16bit(565 format);0x00 is for 8-bit,pixel data format
    //Set the MN of PLL
    Write_Command(0xe2);
    Write_Parameter(0x1d);
    Write_Parameter(0x02);
    Write_Parameter(0x54);
    Write_Command(0xe6);
    Write_Parameter(0x01);
    Write_Parameter(0xdd);
    Write_Parameter(0xde);
    //Set front porch and back porch
    Write_Command(0xb4);
    Write_Parameter(0x01);
    Write_Parameter(0x98);
    Write_Parameter(0x00);
    Write_Parameter(0x44);
    Write_Parameter(0x14);
```

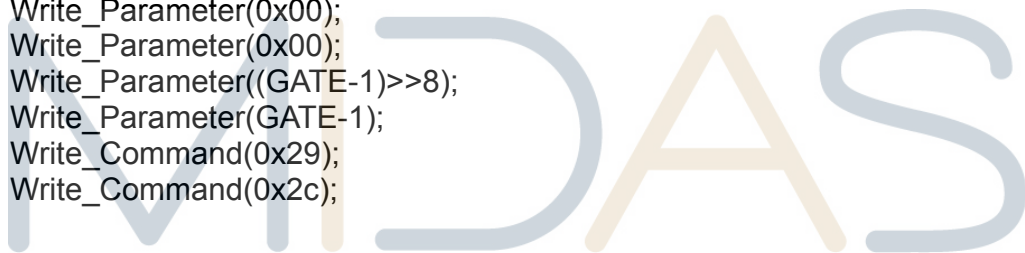


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```
Write_Parameter(0x00);
Write_Parameter(0x00);
Write_Parameter(0x00);
Write_Command(0xb6);
Write_Parameter(0x01);
Write_Parameter(0x06);
Write_Parameter(0x00);
Write_Parameter(0x12);
Write_Parameter(0x04);
Write_Parameter(0x00);
Write_Parameter(0x00);
Write_Command(0x2a);
Write_Parameter(0x00);
Write_Parameter(0x00);
Write_Parameter((SOURCE-1)>>8); /
Write_Parameter(SOURCE-1);
Write_Command(0x2b);
Write_Parameter(0x00);
Write_Parameter(0x00);
Write_Parameter((GATE-1)>>8);
Write_Parameter(GATE-1);
Write_Command(0x29);
Write_Command(0x2c);
```

}



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