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SPECIFICATION FOR LCM MODULE

MODULE NO.: AFA400240C65K-3.0-C03
DOC. REVISION00

Customer Approval:

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	SIGNATURE	DATE
PREPARED BY (RD ENGINEER)		
PREPARED BY (QA ENGINEER)		
CHECKED BY		
APPROVED BY		

DOCUMENT REVISION HISTORY

Version	DATE	DESCRIPTION	CHANGED BY
00	2010-06-05	First issue	

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1. Functions & Features

1.1. Format	: 400x240 Dots
1.2. LCD mode	: Transmissive
1.3. Viewing direction	: 6 O'clock
1.4. Display color	: 262K colors
1.5. Operation temp	: -20~70 °C
1.6. Storage temp	: -30~80 °C
1.7. Power supply voltage (V _{DD})	: 5.0V
1.8. LED power voltage	: 5.0V
1.9. Backlight color	: White(LED)
1.10 LCM Contrast ratio	: 300:1
1.11 LCM Brightness	: 200 nit(tye)
1.12.RoHS standard	

2. MECHANICAL SPECIFICATIONS

2.1. Module size	: 93.0mm(L)*70.0mm(W)*7.0(Max) mm (H)
2.2. Viewing area	: 67.0mm(L)*40.84mm(W)
2.3. Pixel size	: 163.5um(W)*163.5.0um(H)
2.4. Weight	: Approx.

3. BLOCK DIAGRAM

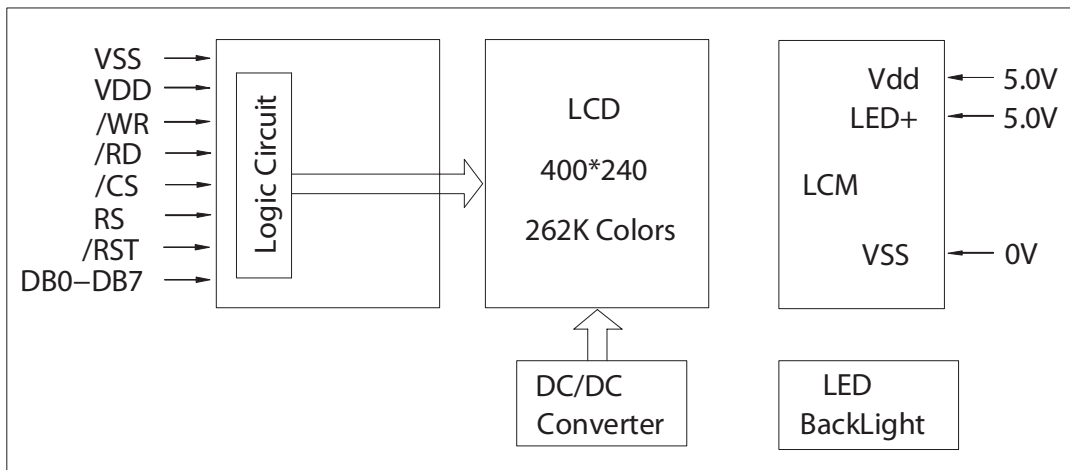
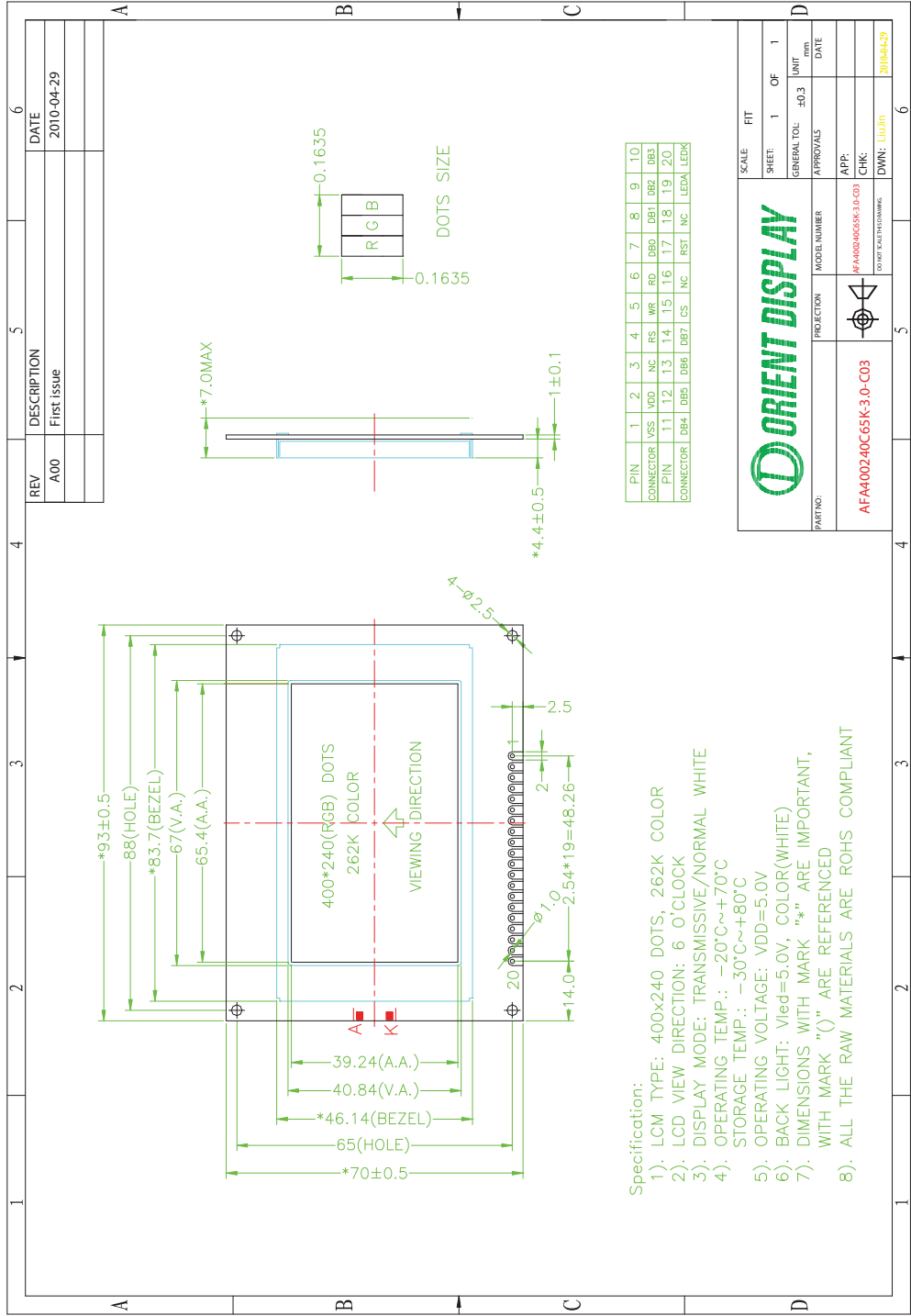


Figure 1. Block diagram

4. DIMENSIONAL OUTLINE



5. PIN DESCRIPTION

No.	Symbol	Function
1	VSS	GND
2	VDD	Logic supply voltage (+5.0V)
3	NC	-----
4	RS	Register selection (H:Data register, L:Instruction register)
5	/WR	Write signal
6	/RD	Read signal
7	D0	Data bus line
8	D1	Data bus line
9	D2	Data bus line
10	D3	Data bus line
11	D4	Data bus line
12	D5	Data bus line
13	D6	Data bus line
14	D7	Data bus line
15	/CS	Chip enable signal
16	NC	-----
17	/RST	Reset signal (L)
18	NC	-----
19	LEDA	Power supply for backlight((+5.0V)
20	LEDK	GND

6. MAXIMUM ABSOLUTE LIMIT

Item	Symbol	MIN	MAX	Unit
Supply Voltage for Logic	V_{DD}	-0.3	5.2	V
Input Voltage	V_{in}	-0.3	$V_{DD}+0.3$	V
Supply Current (Without Backlight)	$I_{DD}(Ta = 25^{\circ}C)$		30	mA
Supply Current for Backlight	$I_F(Ta = 25^{\circ}C)$	---	60	mA
Reverse Voltage for Backlight	$V_R(Ta = 25^{\circ}C)$	---	5.5	V
Operating Temperature	T_{op}	-20	70	$^{\circ}C$
Storage Temperature	T_{st}	-30	80	$^{\circ}C$

7. ELECTRICAL CHARACTERISTICS

Item	Symbol	Condition	Min	Typ	Max	Unit
Supply Voltage for Logic	$V_{DD}-V_{SS}$	$T_a = 25^{\circ}\text{C}$	---	5.0	---	V
Input High Voltage	V_{IH}	$T_a = 25^{\circ}\text{C}$	$0.8V_{DD}$	---	V_{DD}	V
Input Low Voltage	V_{IL}	$T_a = 25^{\circ}\text{C}$	0	---	$0.2V_{DD}$	V
Output High Voltage	V_{OH}	$T_a = 25^{\circ}\text{C}$	$0.8V_{DD}$	---	V_{DD}	V
Output Low Voltage	V_{OL}		0	---	$0.2V_{DD}$	V
Supply Current (Without Backlight)	I_{DD}	$T_a = 25^{\circ}\text{C}$	--	25	30	mA

8. BACKLIGHT CHARACTERISTICS

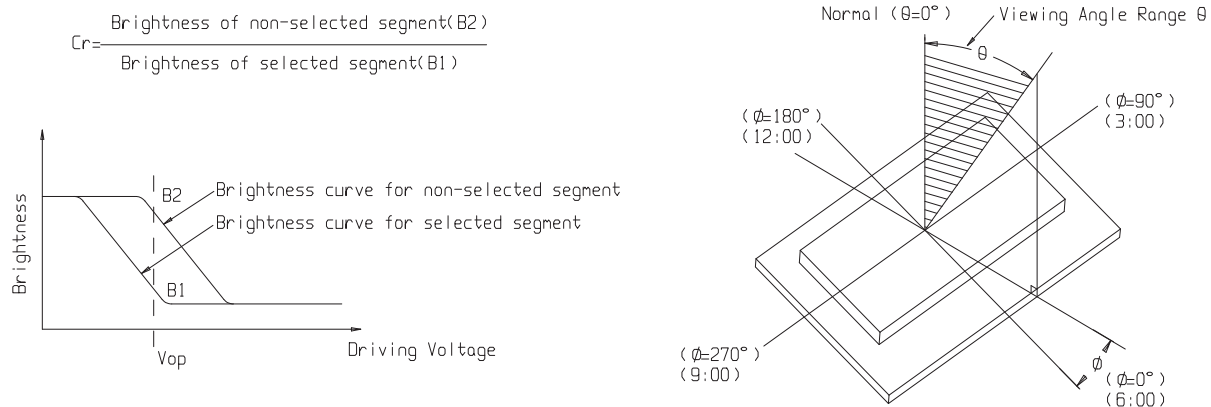
$T_a = 25^{\circ}\text{C}$

Item	Symbol	Condition	Min	Typ	Max	Unit
Forward Voltage	VF	$V_{led}=5.0\text{V}$	---	5.0	---	V
Forward Current	IR	$V_{led}=5.0\text{V}$	---	60	---	mA
Luminous Intensity (With LCD dots off)	IV	$V_{led}=5.0\text{V}$	---	3200	---	Cd/m^2
LED Life time	---	$T_a = 25^{\circ}\text{C}$ Humidity: 70% below Forward Current: 20mA	---	50,000	---	Hr

9. ELECTRO-OPTICAL CHARACTERISTICS

($V_{DD}=5.0\text{V}$, $V_{led}=5.0\text{V}$, $T_a = 25^{\circ}\text{C}$)

Item	Symbol	Condition	Min	Typ	Max	Unit
Viewing angle ($CR \geq 10$)	θ_L	$=180^{\circ}$ (9 o'clock)	---	65	---	degree
	θ_R	$=0^{\circ}$ (3 o'clock)	---	55	---	
	θ_T	$=90^{\circ}$ (12 o'clock)	---	50	---	
	θ_B	$=270^{\circ}$ (6 o'clock)	---	65	---	
Response time	T on	Normal $\theta = 0^{\circ}$	---	25	30	ms
	T off		---	30	35	ms
Contrast ratio	Cr		---	350	---	---
Luminance	L1		---	3200		Cd/m^2



10. TIMING CHARACTERISTICS

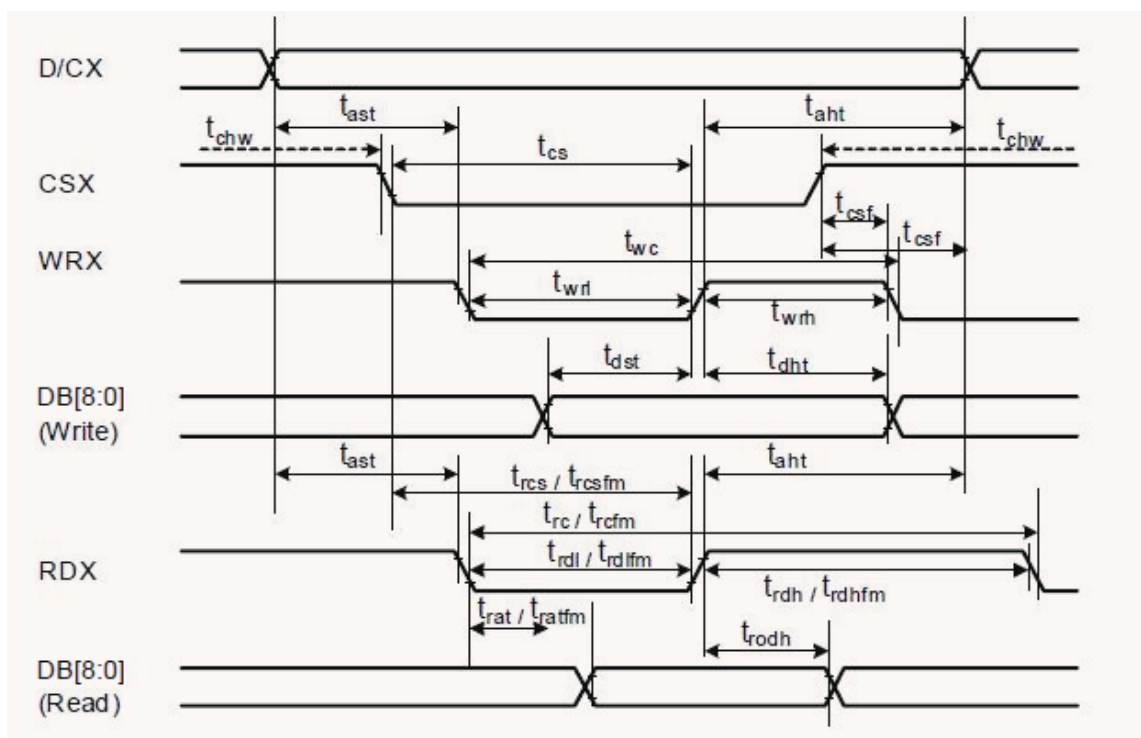


Figure 4. 8080 family Interface Timing

Signal	Symbol	Parameter	min	max	Unit	Description
D/CX	tast	Address setup time	0	-	ns	
	taht	Address hold time (Write/Read)	10	-	ns	
CSX	tchw	CSX "H" Pulse Width	0	-	ns	
	tcs	Chip Select setup time (Write)	20	-	ns	
	trcs	Chip Select setup time (Read ID)	45	-	ns	
	trcsfm	Chip Select setup time (Read FM)	355	-	ns	
	tcsf	Chip Select Wait time (Write/Read)	10	-	ns	
WRX	twc	Write cycle	80	-	ns	
	twrh	Write Control pulse H duration	25	-	ns	
	twrl	Write Control pulse L duration	25	-	ns	
RDX (ID)	trc	Read cycle (ID)	160	-	ns	
	trdh	Read Control pulse H duration (ID)	90	-	ns	
	trdl	Read Control pulse L duration (ID)	45	-	ns	
RDX (FM)	trcfm	Read cycle (FM)	450	-	ns	
	trdhfm	Read Control pulse H duration (FM)	90	-	ns	
	trdlfm	Read Control pulse L duration (FM)	355	-	ns	
DB[8:0]	tdst	Data setup time	10	-	ns	For maximum CL=30pF For minimum CL=8pF
	tdht	Data hold time	10	-	ns	
	trat	Read access time (ID)	-	40	ns	
	tratfm	Read access time (FM)	-	340	ns	
	todh	Output disable time	20	-	ns	

11. CONTROL AND DISPLAY INSTRUCTION

Reference : ILI9327 (IC)

Program Example

```
// 51 MCU, 65K colors
#include <reg51.h>
#include <absacc.h>
#include <ctype.h>
#include <intrins.h>
#include <setjmp.h>
#include <stdarg.h>
#include <stdio.h>
#include <stdlib.h>
#include <string.h>
#include <math.h>
#define uint unsigned int
#define uchar unsigned char
#define xchar unsigned char code
```

```
sbit CSTFT = P3^0;
sbit RSTFT = P3^1;
sbit WRTFT = P3^2;
sbit RDTFT = P3^3;
sbit RESTFT = P3^4;
//-----
uint deyw;
```

```

uint deywd;
uint deyrd;
//-----
void delayms(uint ms)
{
    while(ms)
    { ms--;}
}
//-----
void delay(uint ss)
{
    uint mm;
    while(ss-->0)
    for(mm=0;mm<1000;mm++) { }
}
//-----

void wcomd(uchar index)
{
    CSTFT = 0;
    RSTFT = 0;
    P2 =index;
    WRTFT = 0;delayms(deywc);
    WRTFT = 1;
    CSTFT = 1;
}

void wdatac(uchar datc)
{
    CSTFT = 0;
    RSTFT = 1;
    P2 = datc;
    WRTFT = 0;delayms(deywd);
    WRTFT = 1;
    CSTFT = 1;
}

void wdata(uchar xsdat)
{
    CSTFT = 0;
    RSTFT = 1;
    P2 =xsdat;
    WRTFT = 0;delayms(deywd);
    WRTFT = 1;
    CSTFT = 1;
}

unsigned char rdata(void)
{
    uchar ch;
    P2=0xff;
    CSTFT=0;
    WRTFT=1;
    RSTFT=1;

```

```

    RDTFT=0; delayms(deyrd);
    ch=P2;
    RDTFT=1;
    CSTFT=1;
    return(ch);
}

void initial_tft()
{
    wcomd(0xE9);
    wdatac(0x20);
    wcomd(0x11); //Exit Sleep
    delayms(100);
    wcomd(0xD1);
    wdatac(0x00);
    wdatac(0x54);
    wdatac(0x12);
    wcomd(0xD0);
    wdatac(0x07);
    wdatac(0x01);
    wdatac(0x0f);
    wcomd(0x36);
        wdatac(0x08);
    wcomd(0xC1);
        wdatac(0x10);
        wdatac(0x10);
        wdatac(0x02);
        wdatac(0x02);
    wcomd(0xC0); // Set Default Gamma
        wdatac(0x00);
        wdatac(0x35);
        wdatac(0x00);
        wdatac(0x00);
        wdatac(0x01);
        wdatac(0x02);
    wcomd(0xC5); // Set frame rate
        wdatac(0x02);
    wcomd(0xD2); // power setting
        wdatac(0x01);
        wdatac(0x12);
    wcomd(0xC8); // set gamma
        wdatac(0x04);
        wdatac(0x67);
        wdatac(0x35);
        wdatac(0x04);
        wdatac(0x08);
        wdatac(0x06);
        wdatac(0x24);
        wdatac(0x01);
        wdatac(0x37);
        wdatac(0x40);
        wdatac(0x03);
        wdatac(0x10);
        wdatac(0x08);

```


[illegible]

```

        wdataac(0x01);
        wdataac(0x01);
        wdataac(0x01);
        wdataac(0x01);
        wdataac(0x01);
        wdataac(0x01);
        wdataac(0x01);
        wdataac(0x01);
        wdataac(0x01);
        wdataac(0x01);
        wdataac(0x01);
        wdataac(0x01);
        wdataac(0x01);
        wdataac(0x01);
        wdataac(0x01);
        wdataac(0x01);
        wdataac(0x01);
        wdataac(0x01);
        wdataac(0x01);
        wdataac(0x04);
        wdataac(0x04);
wcomd(0xea); //Enable 3 Gamma
        wdataac(0x80);
wcomd(0x3a);
        wdataac(0x55);
wcomd(0x29);
wcomd(0x2c);
//wcomd(0x10); //enter_sleep
//wcomd(0x11); //exit_sleep
}
//-----
void waddr(uint sadd,uint eadd)
{
    uint temdat1,temdat2,temdat3,temdat4;
    temdat1=sadd/256;
    temdat2=sadd%256;
    temdat3=eadd/256;
    temdat4=eadd%256;

    CSTFT = 0;
    RSTFT = 1;
    P2 = temdat1;
    WRTFT = 0;
    WRTFT = 1;
    P2 = temdat2;
    WRTFT = 0;
    WRTFT = 1;
    CSTFT = 1;

    CSTFT = 0;
    RSTFT = 1;
    P2 = temdat3;

```

```

WRTFT = 0;
WRTFT = 1;
P2 = temdat4;
WRTFT = 0;
WRTFT = 1;
CSTFT = 1;
}
//-----
void disp_all(uchar xsdat1,uchar xsdat2)
{
    uint j,k;

    wcomd(0x2a); //column address set
    waddr(0,399);
    wcomd(0x2b); //row address set
    waddr(0,299);

    wcomd(0x2c);
    for(k=0;k<400;k++)
    {
        for(j=0;j<240;j++)
        {
            wdata(xsdat1);wdata(xsdat2);
        }
    }
}

//=====
////////// MAIN //////////
//=====

void main(void)
{
    RESTFT=0;delay(100);RESTFT=1;delay(10);

    initial_tft();

    deywc=2;
    deywd=2;
    deyrd=2;

    wcomd(0x36);
    wdatac(0x28);
    while(1)
    {
        disp_all(0x00,0x00); delay(200); //display black
        disp_all(0xff,0xff); delay(200); //display white
        disp_all(0xf8,0x00); delay(200); //display red
        disp_all(0x07,0xe0); delay(200); //display green
        disp_all(0x00,0x1f); delay(200); //display blue
        .....
    }
}

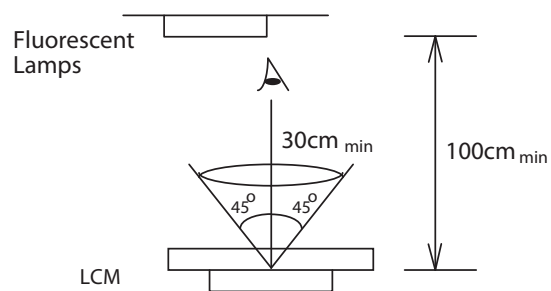
```

12.QUALITY SPECIFICATIONS

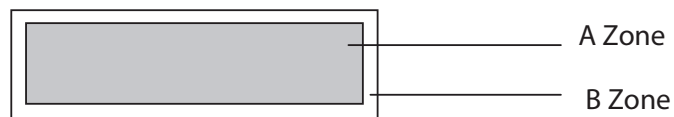
12.1 Standard of the product appearance test

Manner of appearance test: The inspection should be performed in using 20W x 2 fluorescent lamps. Distance between LCM and fluorescent lamps should be 100 cm or more. Distance between LCM and inspector eyes should be 30 cm or more.

Viewing direction for inspection is 45° from vertical against LCM.



Definition of zone:



A Zone: Active display area (minimum viewing area).

B Zone: Non-active display area (outside viewing area).

12.2 Specification of quality assurance

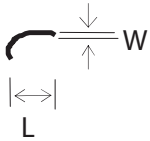
AQL inspection standard

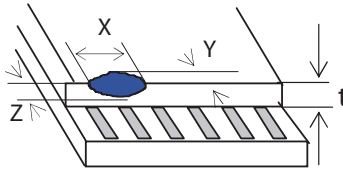
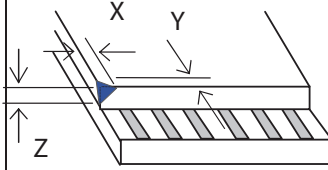
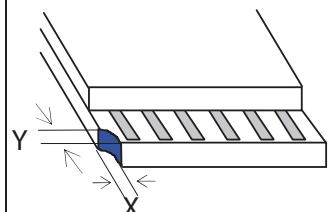
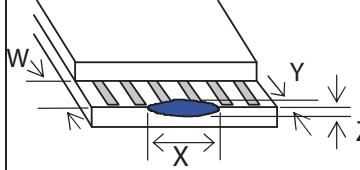
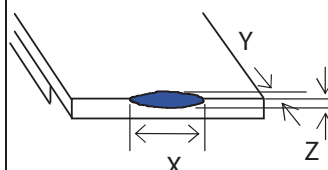
Sampling method: MIL-STD-105E, Level II, single sampling

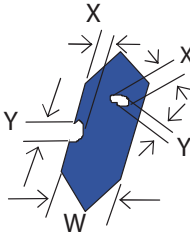
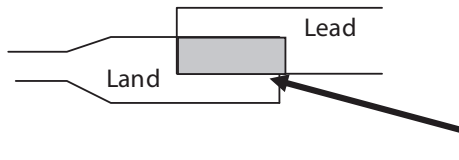
Defect classification (Note: * is not including)

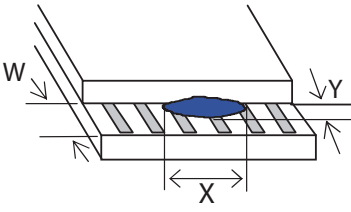
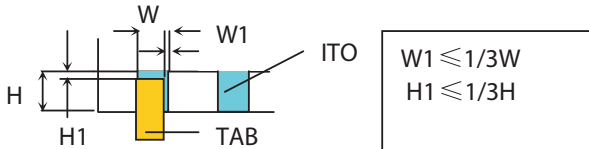
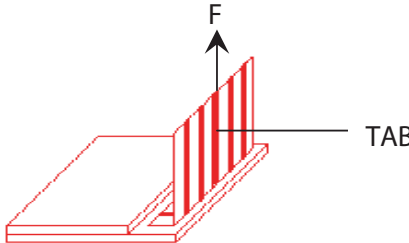
Classify	Item		Note	AQL
Major	Display state	Short or open circuit	1	0.65
		LC leakage		
		Flickering		
		No display		
		Wrong viewing direction		
		Contrast defect (dim, ghost)	2	
		Back-light	1,8	
	Non-display	Flat cable or pin reverse	10	
		Wrong or missing component	11	
Minor	Display state	Background color deviation	2	1.0
		Black spot and dust	3	
		Line defect, Scratch	4	
		Rainbow	5	
		Chip	6	
		Pin hole	7	
	Polarizer	Protruded	12	
		Bubble and foreign material	3	
	Soldering	Poor connection	9	
	Wire	Poor connection	10	
	TAB	Position, Bonding strength	13	

Note on defect classification

No.	Item	Criterion																				
1	Short or open circuit	Not allow																				
	LC leakage																					
	Flickering																					
	No display																					
	Wrong viewing direction																					
	Wrong Back-light																					
2	Contrast defect	Refer to approval sample																				
	Background color deviation																					
3	Point defect, Black spot, dust (including Polarizer)	 <table><thead><tr><th>Point Size</th><th>Acceptable Qty.</th></tr></thead><tbody><tr><td>$\varphi \leq 0.10$</td><td>Disregard</td></tr><tr><td>$0.10 < \varphi \leq 0.20$</td><td>3</td></tr><tr><td>$0.20 < \varphi \leq 0.25$</td><td>2</td></tr><tr><td>$0.25 < \varphi \leq 0.30$</td><td>1</td></tr><tr><td>$\varphi > 0.30$</td><td>0</td></tr></tbody></table> $\varphi = (X+Y)/2$	Point Size	Acceptable Qty.	$\varphi \leq 0.10$	Disregard	$0.10 < \varphi \leq 0.20$	3	$0.20 < \varphi \leq 0.25$	2	$0.25 < \varphi \leq 0.30$	1	$\varphi > 0.30$	0								
	Point Size	Acceptable Qty.																				
$\varphi \leq 0.10$	Disregard																					
$0.10 < \varphi \leq 0.20$	3																					
$0.20 < \varphi \leq 0.25$	2																					
$0.25 < \varphi \leq 0.30$	1																					
$\varphi > 0.30$	0																					
	Unit: mm																					
4	Line defect, Scratch	 <table><thead><tr><th colspan="2">Line</th><th>Acceptable Qty.</th></tr><tr><th>L</th><th>W</th><th></th></tr></thead><tbody><tr><td>---</td><td>$0.015 \geq W$</td><td>Disregard</td></tr><tr><td>$5.0 \geq L$</td><td>$0.03 \geq W$</td><td rowspan="2">2</td></tr><tr><td>$5.0 \geq L$</td><td>$0.05 \geq W$</td></tr><tr><td>$5.0 \geq L$</td><td>$0.1 > W$</td><td>1</td></tr><tr><td>---</td><td>$0.05 < W$</td><td>Applied as point defect</td></tr></tbody></table>	Line		Acceptable Qty.	L	W		---	$0.015 \geq W$	Disregard	$5.0 \geq L$	$0.03 \geq W$	2	$5.0 \geq L$	$0.05 \geq W$	$5.0 \geq L$	$0.1 > W$	1	---	$0.05 < W$	Applied as point defect
	Line		Acceptable Qty.																			
L	W																					
---	$0.015 \geq W$	Disregard																				
$5.0 \geq L$	$0.03 \geq W$	2																				
$5.0 \geq L$	$0.05 \geq W$																					
$5.0 \geq L$	$0.1 > W$	1																				
---	$0.05 < W$	Applied as point defect																				
	Unit: mm																					
5	Rainbow	Not more than two color changes across the viewing area.																				

No	Item	Criterion																																
6	Chip Remark: X: Length direction Y: Short direction Z: Thickness direction t: Glass thickness W: Terminal Width	 Acceptable criterion <table><tr><th>X</th><th>Y</th><th>Z</th></tr><tr><td>≤2</td><td>0.5mm</td><td>≤t/2</td></tr></table>  Acceptable criterion <table><tr><th>X</th><th>Y</th><th>Z</th></tr><tr><td>≤3</td><td>0.5mm</td><td>≤t</td></tr></table>  Acceptable criterion <table><tr><th>X</th><th>Y</th><th>Z</th></tr><tr><td>≤3</td><td>≤2</td><td rowspan="2">≤t</td></tr><tr><td colspan="2">shall not reach to ITO</td></tr></table>  Acceptable criterion <table><tr><th>X</th><th>Y</th><th>Z</th></tr><tr><td>Disregard</td><td>≤0.2</td><td>≤t</td></tr></table>  Acceptable criterion <table><tr><th>X</th><th>Y</th><th>Z</th></tr><tr><td>≤5</td><td>≤2</td><td>≤t/3</td></tr></table>	X	Y	Z	≤2	0.5mm	≤t/2	X	Y	Z	≤3	0.5mm	≤t	X	Y	Z	≤3	≤2	≤t	shall not reach to ITO		X	Y	Z	Disregard	≤0.2	≤t	X	Y	Z	≤5	≤2	≤t/3
X	Y	Z																																
≤2	0.5mm	≤t/2																																
X	Y	Z																																
≤3	0.5mm	≤t																																
X	Y	Z																																
≤3	≤2	≤t																																
shall not reach to ITO																																		
X	Y	Z																																
Disregard	≤0.2	≤t																																
X	Y	Z																																
≤5	≤2	≤t/3																																

No.	Item	Criterion								
7	Segment pattern W = Segment width $\varphi = (X+Y)/2$	(1) Pin hole $\varphi < 0.10\text{mm}$ is acceptable.  <table><tr><th>Point Size</th><th>Acceptable Qty</th></tr><tr><td>$\varphi \leq 1/4W$</td><td>Disregard</td></tr><tr><td>$1/4W < \varphi \leq 1/2W$</td><td>1</td></tr><tr><td>$\varphi > 1/2W$</td><td>0</td></tr></table> Unit: mm	Point Size	Acceptable Qty	$\varphi \leq 1/4W$	Disregard	$1/4W < \varphi \leq 1/2W$	1	$\varphi > 1/2W$	0
Point Size	Acceptable Qty									
$\varphi \leq 1/4W$	Disregard									
$1/4W < \varphi \leq 1/2W$	1									
$\varphi > 1/2W$	0									
8	Back-light	(1) The color of backlight should correspond its specification. (2) Not allow flickering								
9	Soldering	(1) Not allow heavy dirty and solder ball on PCB. (The size of dirty refer to point and dust defect) (2) Over 50% of lead should be soldered on Land. 								
10	Wire	(1) Copper wire should not be rusted (2) Not allow crack on copper wire connection. (3) Not allow reversing the position of the flat cable. (4) Not allow exposed copper wire inside the flat cable.								
11*	PCB	(1) Not allow screw rust or damage. (2) Not allow missing or wrong putting of component.								

No	Item	Criterion
12	Protruded W: Terminal Width	 Acceptable criteria: $Y \leq 0.4$
13	TAB	1. Position  2 TAB bonding strength test  $P (=F/TAB \text{ bonding width}) \geq 650\text{gf/cm}$,(speed rate: 1mm/min) 5pcs per SOA (shipment)
14	Total no. of acceptable Defect	A. Zone Maximum 2 minor non-conformities per one unit. Defect distance: each point to be separated over 10mm B. Zone It is acceptable when it is no trouble for quality and assembly in customer's end product.

12.3 Reliability of LCM

Reliability test condition:

Item	Condition	Time (hrs)	Assessment
High temp. Storage	80°C	48	No abnormalities in functions and appearance
High temp. Operating	70°C	48	
Low temp. Storage	-30°C	48	
Low temp. Operating	-20°C	48	
Humidity	40°C/ 90%RH	48	
Temp. Cycle	-20°C $\boxtimes$ 25°C $\boxtimes$ 70°C (30 min $\boxtimes$ 5 min $\boxtimes$ 30min)	10cycles	

Recovery time should be 24 hours minimum. Moreover, functions, performance and appearance, etc. shall be free from remarkable deterioration within 50,000 hours under ordinary operating and storage conditions room temperature ($20 \pm 8^\circ\text{C}$), normal humidity (below $45 \pm 20\%$ RH), and in the area not exposed to direct sun light. The life time is not content the life time of the LED (for the life time of LED which decay only 50%, in the industry the experience value is 50000 hours, but there are not any experimentation data to support this). .

12.4 Precaution for using LCD/LCM

LCD/LCM is assembled and adjusted with a high degree of precision. Do not attempt to make any alteration or modification. The followings should be noted.

General Precautions:

1. LCD panel is made of glass. Avoid excessive mechanical shock or applying strong pressure onto the surface of display area.
2. The polarizer used on the display surface is easily scratched and damaged. Extreme care should be taken when handling. To clean dust or dirt off the display surface, wipe gently with cotton, or other soft material soaked with isopropyl alcohol, ethyl alcohol or trichlorotrifluoroethane, do not use water, ketone or aromatics and never scrub hard.
3. Do not tamper in any way with the tabs on the metal frame.
4. Do not make any modification on the PCB without consulting Orient Display.
5. When mounting a LCM, make sure that the PCB is not under any stress such as bending or twisting. Elastomer contacts are very delicate and missing pixels could result from slight dislocation of any of the elements.

6. Avoid pressing on the metal bezel, otherwise the elastomer connector could be deformed and lose contact, resulting in missing pixels and also cause rainbow on the display.
7. Be careful not to touch or swallow liquid crystal that might leak from a damaged cell. Any liquid crystal adheres to skin or clothes, wash it off immediately with soap and water.

Static Electricity Precautions:

1. CMOS-LSI is used for the module circuit; therefore operators should be grounded whenever he/she comes into contact with the module.
2. Do not touch any of the conductive parts such as the LSI pads; the copper leads on the PCB and the interface terminals with any parts of the human body.
3. Do not touch the connection terminals of the display with bare hand; it will cause disconnection or defective insulation of terminals.
4. The modules should be kept in anti-static bags or other containers resistant to static for storage.
5. Only properly grounded soldering irons should be used.
6. If an electric screwdriver is used, it should be grounded and shielded to prevent sparks.
7. The normal static prevention measures should be observed for work clothes and working benches.
8. Since dry air is inductive to static, a relative humidity of 50-60% is recommended.

Soldering Precautions:

1. Soldering should be performed only on the I/O terminals.
2. Use soldering irons with proper grounding and no leakage.
3. Soldering temperature: $280^{\circ}\text{C} \pm 10^{\circ}\text{C}$
4. Soldering time: 3 to 4 second.
5. Use eutectic solder with resin flux filling.
6. If flux is used, the LCD surface should be protected to avoid spattering flux.
7. Flux residue should be removed.

Operation Precautions:

1. The viewing angle can be adjusted by varying the LCD driving voltage V_o .
2. Since applied DC voltage causes electro-chemical reactions, which deteriorate the display, the applied pulse waveform should be a symmetric waveform such that no DC component remains. Be sure to use the specified operating voltage.
3. Driving voltage should be kept within specified range; excess voltage will shorten display life.
4. Response time increases with decrease in temperature.
5. Display color may be affected at temperatures above its operational range.
6. Keep the temperature within the specified range usage and storage. Excessive temperature and humidity could cause polarization degradation, polarizer peel-off or generate bubbles.
7. For long-term storage over 40°C is required, the relative humidity should be kept below 60%, and avoid direct sunlight.

Limited Warranty

Orient Display LCDs and modules are not consumer products, but may be incorporated by OD's customers into consumer products or components thereof, Orient Display does not warrant that its LCDs and components are fit for any such particular purpose.

1. The liability of Orient Display is limited to repair or replacement on the terms set forth below. Orient Display will not be responsible for any subsequent or consequential events or injury or damage to any personnel or user including third party personnel and/or user. Unless otherwise agreed in writing between Orient Display and the customer, Orient Display will only replace or repair any of its LCD which is found defective electrically or visually when inspected in accordance with Orient Display general LCD inspection standard. (Copies available on request)
2. No warranty can be granted if any of the precautions state in handling liquid crystal display above has been disregarded. Broken glass, scratches on polarizer mechanical damages as well as defects that are caused accelerated environment tests are excluded from warranty.
3. In returning the LCD/LCM, they must be properly packaged; there should be detailed description of the failures or defect.