



Cert NO. CN09/31395

LCD MODULE SPECIFICATION FOR CUSTOMER'S APPROVAL

Product Model : GG240128B-01

VERSION:1.0

OPTIONAL SPECIFICATION	
LCD	<input type="checkbox"/> Normal Temperature (0~50℃) <input checked="" type="checkbox"/> Wide Temperature (-20~+70℃) <input type="checkbox"/> Super Wide Temperature (-30~+80℃)
	<input type="checkbox"/> Yellow&Green <input type="checkbox"/> Blue <input type="checkbox"/> Gray <input checked="" type="checkbox"/> Black & White
Backlight	LED Backlight <input checked="" type="checkbox"/> White light <input type="checkbox"/> Green light <input type="checkbox"/> Yellow&Green light <input type="checkbox"/> Blue light
DC to DC Circuit	<input checked="" type="checkbox"/> Build-in <input type="checkbox"/> Not Build-in
Controller	<input checked="" type="checkbox"/> Build-in <input type="checkbox"/> Not Build-in

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RECORD OF REVISION

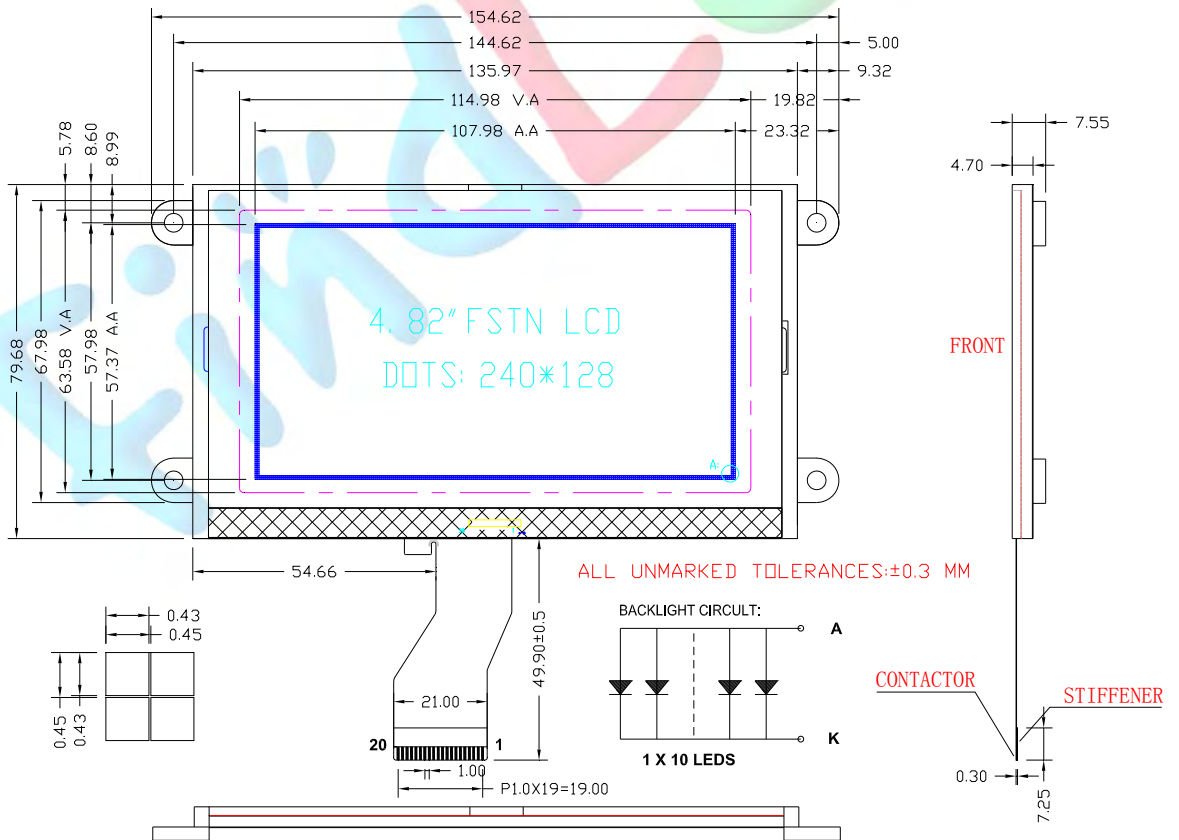
Version	Revision Date	Contents	Editor
1.0	2013-1-21	New Release	L.Y

FindLCD

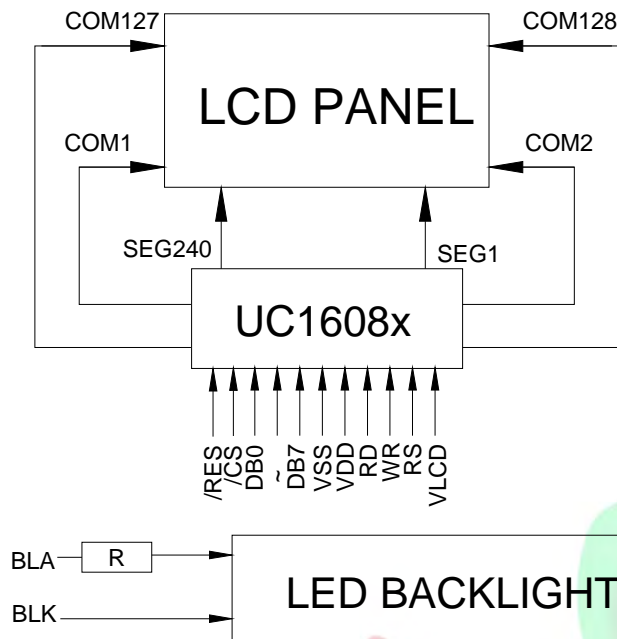
1. PHYSICAL DATA

Item	Contents	Unit
LCD type	FSTN/Positive/Transflective	---
LCD duty	1/128	---
LCD bias	1/12	---
Viewing direction	12	o'clock
Module size (W×H×T)	154.62×79.68×7.55	mm
Number of dots(W×H)	240 ×128	dots
Dot Size(W×H))	0.43×0.43	mm
Dot Pitch(W×H))	0.45×0.45	mm

2. EXTERNAL DIMENSIONS



3. BLOCK DIAGRAM



Parallel Interfaces:

PIN NO.	Symbol	Level	Description
1	/RES	H/L	Reset pin.
2	/CS	H/L	Chip select.
3	RS	H/L	H, Data; L, Instruction command.
4	/WR	H/L	Write signal.
5	/RD	H/L	Read signal.
6~13	DB0~DB7	H/L	Data bus.
14	VDD	---	Power supply.
15	VSS	---	Ground.
16	VLCD	---	Power supply for LCD.
17	NC	---	No connection.
18	NC	---	No connection.
19	BLA	---	Backlight anode.
20	BLK	---	Backlight cathode.

4-Wire Serial Interfaces:

PIN NO.	Symbol	Level	Description
1	/RES	L	Reset pin.
2	/CS	L	Chip select.
3	RS	H/L	H, Data; L, Instruction command.
4-5	VSS	---	Connect to VSS.
6	SCL	H/L	Serial clock input.
7-8	VSS	---	Connect to VSS.
9	SDA	H/L	Serial data input.
10-12	VSS	---	Connect to VSS.
13-14	VDD	---	Connect to Power supply.
15	VSS	---	Ground.
16	VLCD	---	Power supply for LCD.
17-18	NC	---	No connection.
19	BLA	---	Backlight anode.
20	BLK	---	Backlight cathode.

3-Wire Serial Interfaces:

PIN NO.	Symbol	Level	Description
1	/RES	L	Reset pin.
2	/CS	L	Chip select.
3-5	VSS	---	Connect to VSS.
6	SCL	H/L	Serial clock input.
7-8	VSS	---	Connect to VSS.
9	SDA	H/L	Serial data input.
10-12	VSS	---	Connect to VSS.
13-14	VDD	---	Connect to Power supply.
15	VSS	---	Ground.
16	VLCD	---	Power supply for LCD.
17-18	NC	---	No connection.
19	BLA	---	Backlight anode.
20	BLK	---	Backlight cathode.

4. ABSOLUTE MAXIMUM RATINGS

(1) Electrical Absolute Ratings

Item	Symbol	Min.	Max.	Unit	Note
Power Supply for Logic	V _{DD}	0	3.47	Volt	Note 1
Power Supply for LCD	V _{LCD}	0	18	Volt	
Input Voltage	V _I	0	V _{DD}	Volt	
Current for LED backlight	I _{LED}		200	mA	

Note 1 : Operator should be grounded during handling LCM

(2) Environmental Absolute Maximum Ratings

Item	Normal Temperature				Wide Temperature			
	Operating		Storage		Operating		Storage	
	Min.	Max,	Min.	Max,	Min.	Max,	Min.	Max,
Ambient Temperature	0℃	+50℃	-10℃	+60℃	-20℃	+70℃	-30℃	+80℃
Humidity(without condensation)	Note 2,4		Note 3,5		Note 4,5		Note 4,6	

Note 2 Ta ≤ 50℃ : 80% RH max

Ta > 50℃ : Absolute humidity must be lower than the humidity of 85%RH at 50℃

Note 3 Ta at -20℃ will be <48hrs at 70℃ will be <120hrs when humidity is higher than 75%.

Note 4 Background color changes slightly depending on ambient temperature. This phenomenon is reversible.

Note 5 Ta ≤ 70℃ : 75RH max

Ta > 70℃ : absolute humidity must be lower than the humidity of 75%RH at 70℃

Note 6 Ta at -20℃ will be <48hrs, at 80℃ will be <120hrs when humidity is higher than 75%.

5. ELECTRICAL CHARACTERISTICS

DC Characteristics

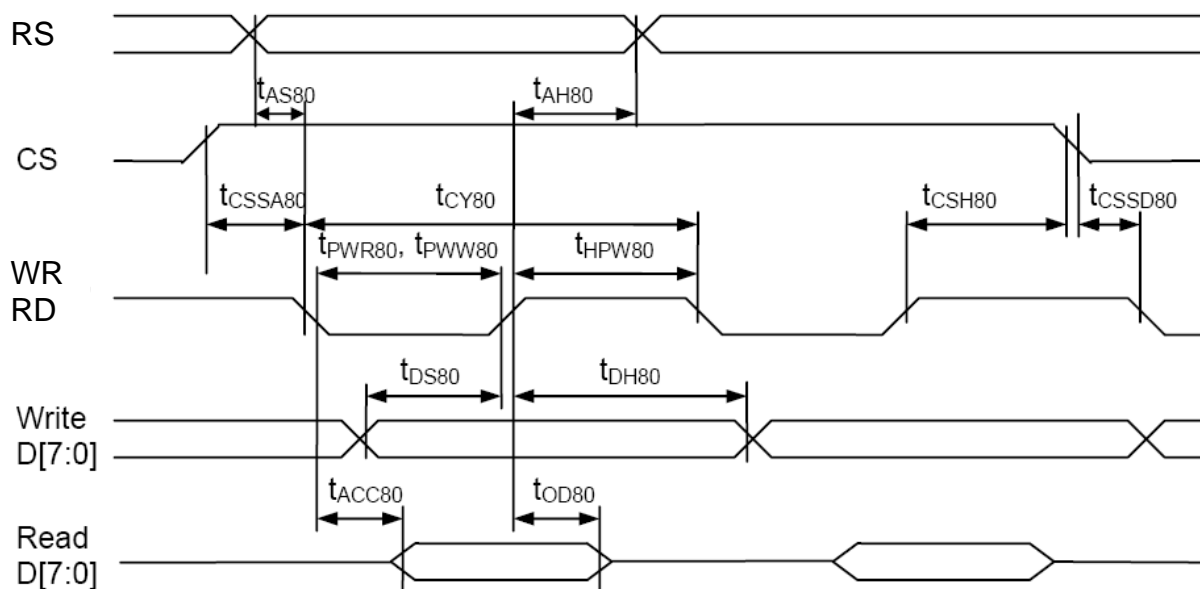
(VDD=3.0V;VSS=0V; Ta=25°C)

Item	Symbol	Condition	Min.	Typ.	Max.	Unit
Power Supply for Logic	V _{DD} -V _{SS}	---	2.7	3.0	3.3	Volt
Input Voltage	V _{IL}	---	---	---	0.2 VDD	Volt
	V _{IH}	---	0.8VDD	---	---	Volt
Output Voltage	V _{OL}	---	---	---	0.2 VDD	Volt
	V _{OH}	---	0.8VDD	---	---	Volt
LCM Recommend LCD Module Driving Voltage	V _{LCD}	T _a =0°C	---	---	---	Volt
		T _a =25°C	14.8	15	15.2	
		T _a =50°C	---	---	---	
Power Supply Current for LCM	I _{DD} (B/L OFF)	---	---	---	TBD	mA
	I _{LED} (B/L ON)	---	100	150	200	
Power Supply for LED Backlight	V _{BLA} - V _{BLK}	Ta=25°C	2.9	3.0	3.1	Volt

AC Characteristics

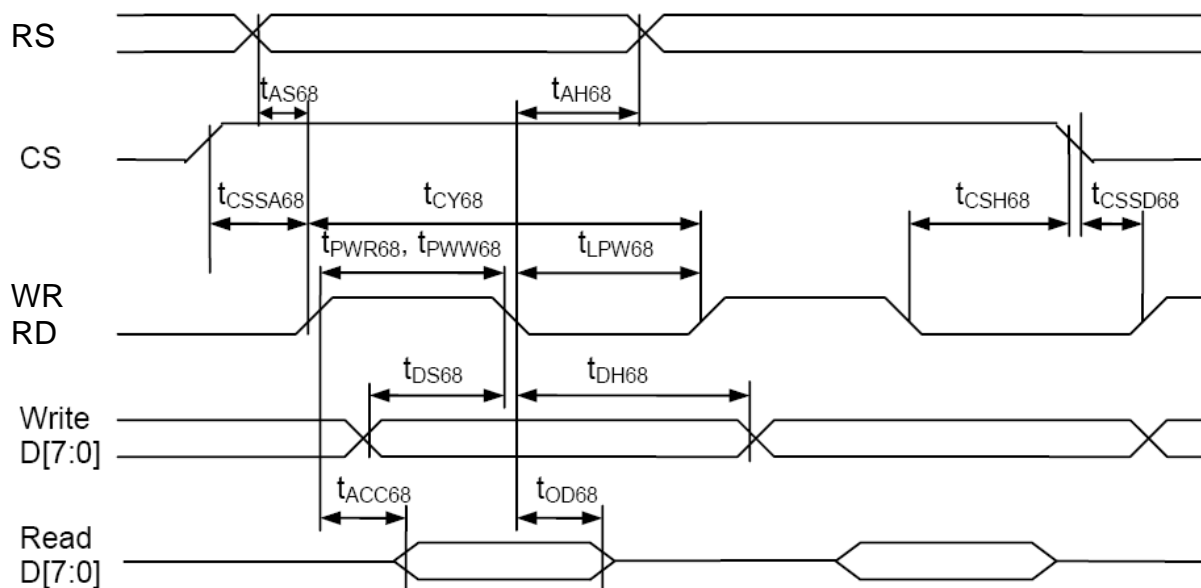
(VDD=3.0V, Ta=25°C)

Parallel Bus Timing Characteristics (for 8080 MCU)



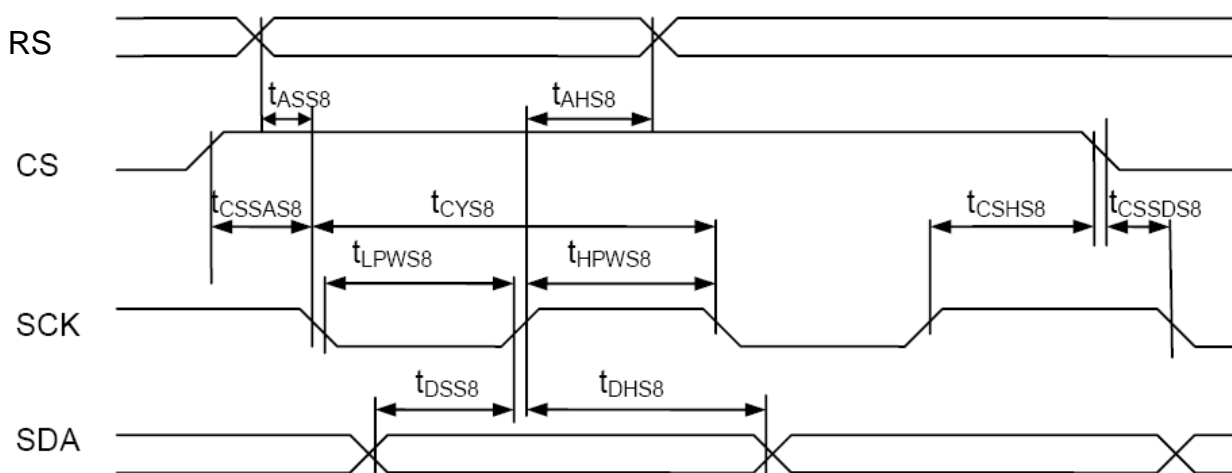
Symbol	Signal	Description	Condition	Min.	Max.	Units
tAS80 tAH80	RS	Address setup time Address hold time		0 20	---	ns
tCY80		System cycle time 8-bit bus(read) 8-bit bus(write) 4-bit bus(read) 4-bit bus(write)		140 140 140 140	---	ns
tPWR80	RD	Pulse width 8-bit bus(read) 4-bit bus(read)		65 65	---	ns
tPWW80	WR	Pulse width 8-bit bus(write) 4-bit bus(write)		35 35	---	ns
tHPW80	WR/RD	High pulse width 8-bit bus(read) (write) 4-bit bus(read) (write)		65 35 65 35	---	ns
tDS80 tDH80	DB0~DB7	Data setup time Data hold time		30 20	---	ns
tACC80 tOD80		Read access time Output disable time	CL=100pF	---	60 20	ns
tSSA80 tCSSD80 tCSH80	CS	Chip select setup time		10 10 20	---	ns

Parallel Bus Timing Characteristics (for 6800 MCU)



Symbol	Signal	Description	Condition	Min.	Max.	Units
tAS68 tAH68	A0	Address setup time Address hold time		0 20	–	ns
TCY68		System cycle time		140	–	ns
		8-bit bus (read)		140		
		8-bit bus (write)		140		
		4-bit bus (read)		140		
tPWR68	RD	Pulse width		65	–	ns
		8-bit bus (read) 4-bit bus (read)		65		
tPWW68	WR	Pulse width		35	–	ns
		8-bit bus (write) 4-bit bus (write)		35		
tLPW68	RD WR	Low pulse width		65	–	ns
		8-bit bus (read)		35		
		8-bit bus (write)		65		
		4-bit bus (read) 4-bit bus (write)		35		
tDS68 tDH68	D0~D7	Data setup time Data hold time		30 20	–	ns
tACC68 tOD68		Read access time Output disable time	CL = 100pF	– 12	60 20	ns
tCSSA68 tCSSD68 tCSH68	CS	Chip select setup time		10 10 20		ns

Serial Bus Timing Characteristics

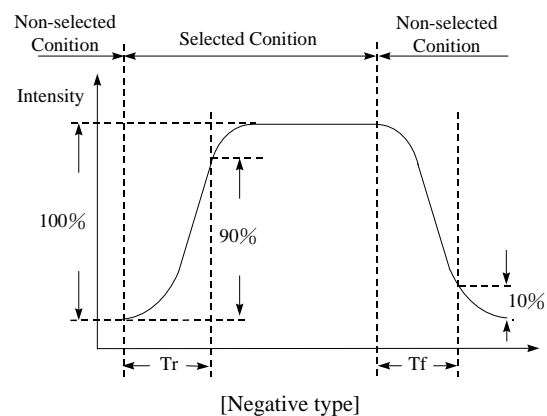
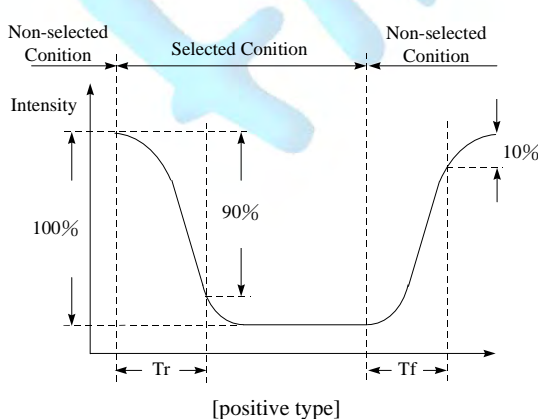


Symbol	Signal	Description	Condition	Min.	Max.	Units
tASS8	CD	Address setup time		0	–	nS
tAHS8		Address hold time		20	–	nS
tCYS8	SCK	System cycle time		140	–	nS
tLPWS8		Low pulse width		65	–	nS
tHPWS8		High pulse width		65	–	nS
tDSS8	SDA	Data setup time		30	–	nS
tDHS8		Data hold time		20	–	nS
tCSSAS8	CS	Chip select setup time		10		nS
tCSSDS8				20		
tCSHS8				10		

6. ELECTRO-OPTICAL CHARACTERISTICS

Item	Symbol	Condition	Min.	Typ.	Max.	Unit	note
Viewing angle range	θ_f (12 o'clock)	When $Cr \geq 2$	35	---	---	Degree	Note 2 Note 3 Note 4
	θ_b (6 o'clock)		30	---	---		
	θ_l (9 o'clock)		30	---	---		
	θ_r (3 o'clock)		30	35	---		
Rise Time	T_r	$V_{DD}-V_0=8.7V$ $T_a=25^\circ C$		112		mS	Note 1
Fall Time	T_f			250			
Contrast	Cr		---	5.4	---		

[Note 1] Definition of Response Time (T_r , T_f)

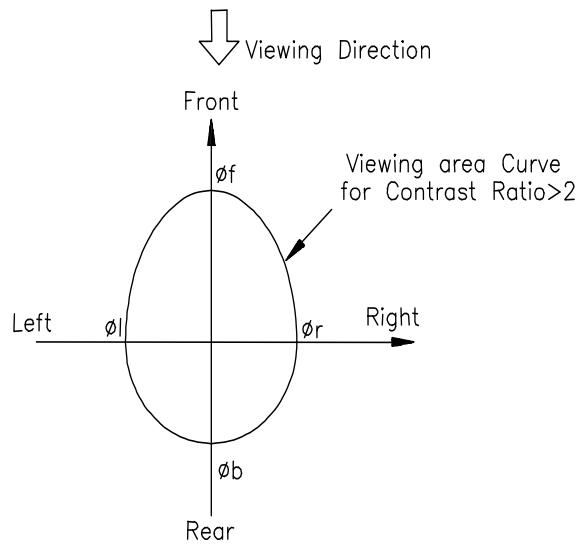


Conditions:

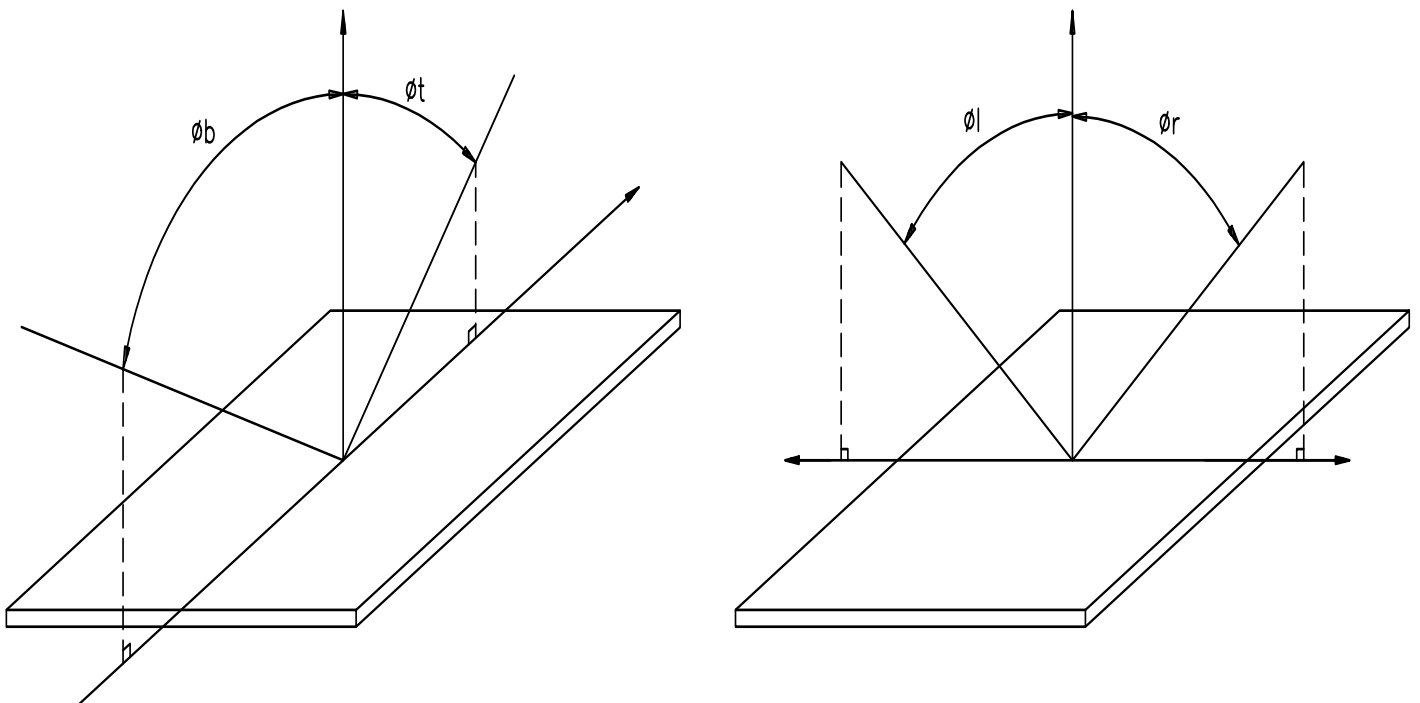
Operating Voltage : V_{op}
Frame Frequency : 64 Hz

Viewing Angle(θ , φ): 0° , 0°
Driving Wave form : 1/N duty, 1/a bias

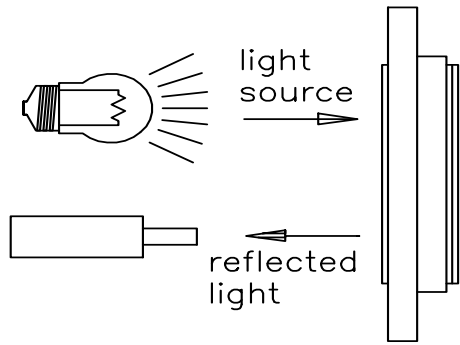
[Note 2] Definition of Viewing Direction



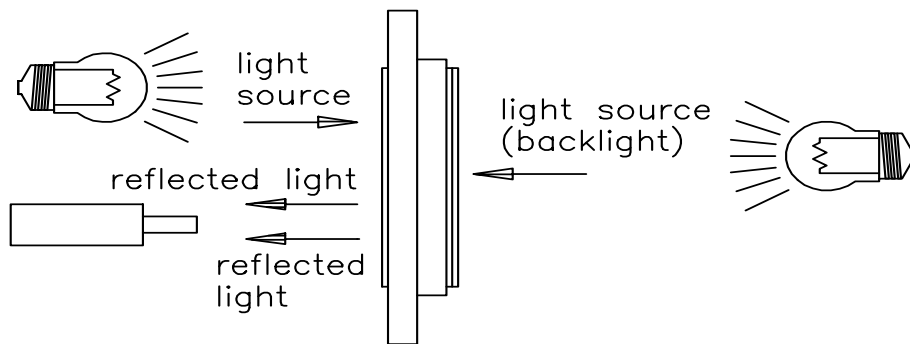
[Note 3] Definition of viewing angle



[Note 4] Description of Measuring Equipment



Reflective type



Transflective type

7. OPERATING PRINCIPLES & METHODS

The following is a list of host commands supported by UC1608x

C/D: 0: Control, 1: Data
 W/R: 0: Write Cycle, 1: Read Cycle
 # Useful Data bits
 – Don't Care

	Command	C/D	W/R	D7	D6	D5	D4	D3	D2	D1	D0	Action	Default
1	Write Data Byte	1	0	#	#	#	#	#	#	#	#	Write 1 byte	N/A
2	Read Data Byte	1	1	#	#	#	#	#	#	#	#	Read 1 byte	N/A
3	Get Status	0	1	BZ	MX	DE	RS	WA	GN1	GN0	1	Get Status	N/A
4	Set Column Address LSB	0	0	0	0	0	0	#	#	#	#	Set CA[3:0]	0
	Set Column Address MSB	0	0	0	0	0	1	#	#	#	#	Set CA[7:4]	0
5	Set Mux Rate and temperature compensation.	0	0	0	0	1	0	0	#	#	#	Set {MR, TC[1:0]}	MR: 1b TC: 00b
6	Set Power Control	0	0	0	0	1	0	1	#	#	#	Set PC[2:0]	101b
7	Set Adv. Program Control (double byte command)	0	0	0	0	1	1	0	0	0	R	For UltraChip only. Do not use.	N/A
		0	0	#	#	#	#	#	#	#	#		
8	Set Start Line	0	0	0	1	#	#	#	#	#	#	Set SL[5:0]	0
9	Set Gain and Potentiometer (double-byte command)	0	0	1	0	0	0	0	0	0	1	Set {GN[1:0], PM[5:0]}	GN=3 PM=0
		0	0	#	#	#	#	#	#	#	#		
10	Set RAM Address Control	0	0	1	0	0	0	1	#	#	#	Set AC[2:0]	001b
11	Set All-Pixel-ON	0	0	1	0	1	0	0	1	0	#	Set DC[1]	0=disabl e
12	Set Inverse Display	0	0	1	0	1	0	0	1	1	#	Set DC[0]	0=disabl e
13	Set Display Enable	0	0	1	0	1	0	1	1	1	#	Set DC[2]	0=disabl e
14	Set Fixed Lines	0	0	1	0	0	1	#	#	#	#	Set FL[3:0]	0
15	Set Page Address	0	0	1	0	1	1	#	#	#	#	Set PA[3:0]	0
16	Set LCD Mapping Control	0	0	1	1	0	0	#	#	#	#	Set LC[3:0]	0
17	System Reset	0	0	1	1	1	0	0	0	1	0	System Reset	N/A
18	NOP	0	0	1	1	1	0	0	0	1	1	No operation	N/A
19	Set LCD Bias Ratio	0	0	1	1	1	0	1	0	#	#	Set BR[1:0]	10b=12
20	Reset Cursor Mode	0	0	1	1	1	0	1	1	1	0	AC[3]=0, CA=CR	N/A
21	Set Cursor Mode	0	0	1	1	1	0	1	1	1	1	AC[3]=1, CR=CA	N/A
22	Set Test Control (double byte command)	0	0	1	1	1	0	0	1	TT	For UltraChip only. Do not use.	N/A	
		0	0	#	#	#	#	#	#				

NOTE: For more detail information, please refer to the UC1608's specification.

8. RELIABILITY

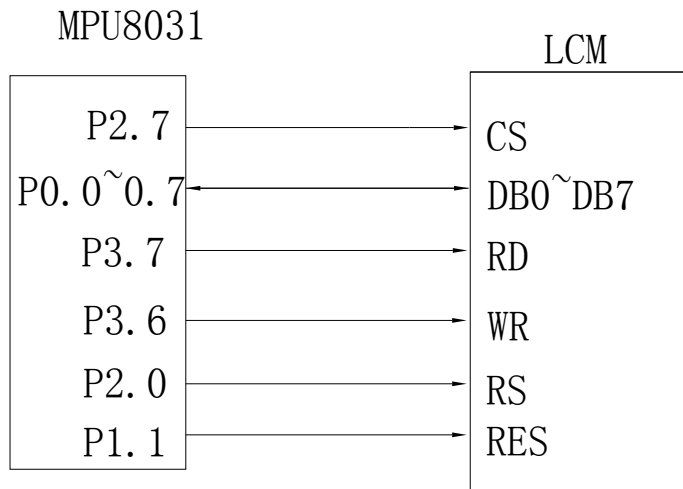
Environmental Test				
No.	Test Item	Content of Test	Test Condition	Applicable Standard
1	High temperature storage	Endurance test applying the high storage temperature for a long time.	80 °C 120 hrs	-----
2	Low temperature storage	Endurance test applying the low storage temperature for a long time.	-30 °C 120 hrs	-----
3	High temperature operation	Endurance test applying the electric stress (Voltage & Current) and the thermal stress to the element for a long time.	70 °C 72 hrs	-----
4	Low temperature operation	Endurance test applying the electric stress under low temperature for a long time.	-20 °C 72 hrs	-----
5	High temperature / Humidity storage	Endurance test applying the high temperature and high humidity storage for a long time.	70 °C , 90 %RH 72 hrs	MIL-202E-103B JIS-C5023
6	High temperature / Humidity operation	Endurance test applying the electric stress (Voltage & Current) and temperature / humidity stress to the element for a long time.	50 °C , 90 %RH 72 hrs	MIL-202E-103B JIS-C5023
7	Temperature cycle	Endurance test applying the low and high temperature cycle. $\begin{array}{ccccc} -10^{\circ}\text{C} & \rightleftharpoons & 25^{\circ}\text{C} & \rightleftharpoons & 60^{\circ}\text{C} \\ 30\text{min} & & 5\text{min.} & & 30\text{min} \\ \longleftarrow & & & & \longrightarrow \\ & & 1 \text{ cycle} & & \end{array}$	-10°C / 60°C 10 cycles	-----
Mechanical Test				
8	Vibration test	Endurance test applying the vibration during transportation and using.	10~22Hz → 1.5mmp-p 22~500Hz → 1.5G Total 0.5hrs	MIL-202E-201A JIS-C5025 JIS-C7022-A-10
9	Shock test	Constructional and mechanical endurance test applying the shock during transportation.	50G half sign wave 11 msdc 3 times of each direction	MIL-202E-213B
10	Atmospheric pressure test	Endurance test applying the atmospheric pressure during transportation by air.	115 mbar 40 hrs	MIL-202E-105C
Others				
11	Static electricity test	Endurance test applying the electric stress to the terminal.	VS=800V , RS=1.5 kΩ CS=100 pF 10 time	MIL-883B-3015.1
Inspection after test: Inspection after 2~4 hours storage at room temperature ,the sample shall be free from defects: <ol style="list-style-type: none"> Air bubble in the LCD. Sealleak Non-display. Missing segments. Glass crack. Current Idd is twice higher than initial value. 				

9. QUALITY GUARANTEE

No	Item	Criteria																				
1	inclusions (black spot, white spot, dust)	<p>(1)round type</p> <table> <tr> <td>diameter mm(a*)</td> <td>no of defect*</td> </tr> <tr> <td>$a \leq 0.20$</td> <td>neglect</td> </tr> <tr> <td>$0.20 < a \leq 0.35$</td> <td>5max</td> </tr> <tr> <td>$0.35 < a$</td> <td>none</td> </tr> </table> <p>(2)linear type</p> <table> <tr> <td>length mm(l)</td> <td>width mm(W)</td> <td>no. of defect</td> </tr> <tr> <td>na</td> <td>$W \leq 0.03$</td> <td>neglect</td> </tr> <tr> <td>$1 \leq l$</td> <td>$0.03 < W \leq 0.08$</td> <td>6</td> </tr> <tr> <td>$3 < l$</td> <td>$0.08 < W$</td> <td>none</td> </tr> </table>	diameter mm(a*)	no of defect*	$a \leq 0.20$	neglect	$0.20 < a \leq 0.35$	5max	$0.35 < a$	none	length mm(l)	width mm(W)	no. of defect	na	$W \leq 0.03$	neglect	$1 \leq l$	$0.03 < W \leq 0.08$	6	$3 < l$	$0.08 < W$	none
diameter mm(a*)	no of defect*																					
$a \leq 0.20$	neglect																					
$0.20 < a \leq 0.35$	5max																					
$0.35 < a$	none																					
length mm(l)	width mm(W)	no. of defect																				
na	$W \leq 0.03$	neglect																				
$1 \leq l$	$0.03 < W \leq 0.08$	6																				
$3 < l$	$0.08 < W$	none																				
2	scratch	<p>1.scratch on protective film is permitted. 2.scratch on polarizer shall be as follow:</p> <p>(1)round type</p> <table> <tr> <td>diameter mm(a*)</td> <td>no of defect</td> </tr> <tr> <td>$a \leq 0.15$</td> <td>neglect</td> </tr> <tr> <td>$0.15 < a \leq 0.20$</td> <td>2 max</td> </tr> <tr> <td>$0.20 < a$</td> <td>none</td> </tr> </table> <p>(2)linear type be judged by 1.-(2) linear type</p>	diameter mm(a*)	no of defect	$a \leq 0.15$	neglect	$0.15 < a \leq 0.20$	2 max	$0.20 < a$	none												
diameter mm(a*)	no of defect																					
$a \leq 0.15$	neglect																					
$0.15 < a \leq 0.20$	2 max																					
$0.20 < a$	none																					
3	dent	diameter < 1.5mm																				
4	bubble	not exceeding 0.5mm average diameter is acceptable between glass and polarizing film																				
5	pin hole	$(a+b)/2 \leq 0.15\text{mm}$ maximum number: ignored $0.15 < (a+b)/2 \leq 0.20\text{mm}$ maximum number:10																				
6	dot width	design width $\pm 15\%$																				
7	dot defect	$(a+b)/2 \leq 0.20\text{mm}$ maximum number: ignored $0.20 < (a+b)/2 \leq 0.30\text{mm}$ maximum number:5 x=width																				
8	contrast irregularity(spot)	<table> <tr> <td>diameter spec</td> <td>no of defect</td> </tr> <tr> <td>$a \leq 0.50\text{mm}$</td> <td>neglect</td> </tr> <tr> <td>$0.50 < a \leq 0.75$</td> <td>5</td> </tr> <tr> <td>$0.75 < a \leq 1.00$</td> <td>3</td> </tr> <tr> <td>$1.00 < a$</td> <td>none</td> </tr> </table>	diameter spec	no of defect	$a \leq 0.50\text{mm}$	neglect	$0.50 < a \leq 0.75$	5	$0.75 < a \leq 1.00$	3	$1.00 < a$	none										
diameter spec	no of defect																					
$a \leq 0.50\text{mm}$	neglect																					
$0.50 < a \leq 0.75$	5																					
$0.75 < a \leq 1.00$	3																					
$1.00 < a$	none																					
9	color tone and uniformity	obvious uneven color is not permitted																				

10. Interface circuit and driving programme on LCM of dots matrix series .

(1) Interface circuit:



(2) The parallel programme of testing for the module

```

//连线表: CPU=W78E54B CPUclock=12Mhz *
// LCM ----- CPU *
// WR ----- WR *
// RD ----- RD *
// CS ----- P2.7 *
// CD(RS)----- P2.0 *
// RST ----- /CPU_RESET *
// DB0~7 ----- P0.0~7 *
//*****
#include <reg52.h>
#include <intrins.h>

#define BUS_MODE //总线直接访问方式
//#define IO_MODE //IO口间接访问方式

#define LcmXPixel 240 //横向宽度
#define LcmYPixel 128 //纵向高度
#define Uchar unsigned char
#define Uint unsigned int

char xdata LcmCmdPort_at_0x8000; //RS=0 指令, CS 片选高电平有效
char xdata LcmDataPort_at_0x8100; //RS=1 数据

sbit CS = P2^7;
sbit RS_CD = P2^0;
sbit WR0_WR = P3^6;
sbit WR1_RD = P3^7;
sbit RES = P1^1; //测试架是把 MCU 的复位经一个非门送到 LCM
sbit Key = P3^4; //测试架锁定按键
Uchar code bmp1[];
Uchar code HZTable[];

//函数功能: 延时函数
//入口参数: 需要延时的毫秒数(MS)
//出口参数: 无
void DelayMS(unsigned int MS)
{
    unsigned char us, usn;
    while(MS!=0)
    {
        usn = 2; //for 12M
        while(usn!=0)
        {
            us=0xf6;
            while (us!=0) {us--};
            usn--;
        }
        MS--;
    }
}

//入口参数: 需要延时的?.?秒 (Second. MS100)
//出口参数: 无
void DelayKey(unsigned int Second, unsigned int MS100)
  
```



```

{
    //输入精确到 0.1S, 是用,
    unsigned int i;
    for(i=0; i<Second*100+MS100*10; i++)
    {
        if(Key==0)
        {
            DelayMS(20);
            while(Key==0) {DelayMS(20);}
            break;
        }
        else DelayMS(10);
    }
}

//函数功能: 底层写命令函数
//入口参数: 命令字 CommandByte
//出口参数: 无
void WriteCommand( Uchar CommandByte )
{
#ifdef BUS_MODE
    LcmCmdPort = CommandByte;
#endif

#ifdef IO_MODE
    WR1_RD = 1;
    CS = 1;
    RS_CD = 0;
    PO = CommandByte;
    WRO_WR = 0;
    WRO_WR = 1;
    CS = 0;
    PO = 0xff;
#endif
}

//函数功能: 底层写数据函数
//入口参数: 数据字 dataW
//出口参数: 无
void WriteData( Uchar dataW )
{
#ifdef BUS_MODE
    LcmDataPort = dataW;
#endif

#ifdef IO_MODE
    WR1_RD = 1;
    CS = 1;
    RS_CD = 1;
    PO = dataW;
    WRO_WR = 0;
    WRO_WR = 1;
    CS = 0;
    PO = 0xff;
#endif
}

//函数功能: 底层读数据函数
//入口参数: 无, 但要先 LocateXY 当前位置
//出口参数: 读出的数据 Rdata
Uchar ReadData( void )
{
#ifdef BUS_MODE
    Uchar Rdata;
    Rdata = LcmDataPort;
    return Rdata;
#endif

#ifdef IO_MODE
    Uchar Rdata;
    WRO_WR = 1;
    CS = 1;
    RS_CD = 1;
    PO = 0xff;
    WR1_RD = 0;
    Rdata = PO;
    WR1_RD = 1;
    CS = 0;
    return Rdata;
#endif
}

//函数功能: 液晶屏初始化函数
//入口参数: 无
//出口参数: 无
void LcmInit( void )
{

```

```

WriteCommand(0xE2); //发指令让芯片复位,不管外部 RST 脚有没有进行复位,软件复位还是进行一下为好.
DelayMS(50); //延时等待复位完成
WriteCommand(0x10); //设置列地址高 4bit (0-239)
WriteCommand(0x00); //设置列地址低 4bit
WriteCommand(0xB0); //设置页地址 (0-15)
WriteCommand(0x24); //设置 duty=128 和温度补偿系数
WriteCommand(0x2F); //设置电源,用内部 VLCD
WriteCommand(0x40); //设置起始行=0
WriteCommand(0x81); //设置 Vop 电压 (调节对比度)
WriteCommand(0xC7); //Gain[1:0]=11, PM=7 (0-63)
WriteCommand(0x89); //设置 RAM 地址方向控制,列地址+1
WriteCommand(0xE8); //设置 Bias=1/10.7
WriteCommand(0xCD); //设置 SEG 反向,COM 反向,字节 D7 对应竖向第一个点
WriteCommand(0xAF); //开显示
DelayMS(5);
}

```

//函数功能: 用某字节数据填充当前屏幕,可以用作清屏

//入口参数: 无

//出口参数: 无

void FillBMP(Uchar X)

```

{
    Uint i=LcmXPixel*LcmYPixel/8;
    WriteCommand(0x10); //设置列地址高 4bit (0-239)
    WriteCommand(0x00); //设置列地址低 4bit
    while(i--)
    {
        WriteData( X );
    }
}

```

//函数功能: 在当前屏幕显示一副 240*128 图片

//入口参数: 要显示的图片*puts

//出口参数: 无

void PutBmp(Uchar *puts)

```

{
    Uint X=0;
    Uchar i, j;
    for(i=0;i<(LcmYPixel/8);i++)
    {
        for(j=0;j<LcmXPixel;j++)
        {
            WriteData( puts[X] );
            X++;
        }
    }
}

```

//函数功能: 在当前屏幕显示 Dots 点阵

//入口参数: 点阵基数,点阵间距

//出口参数: 无

void PutDots(Uchar x,Uchar n)

```

{
    Uint i;
    Uchar j;
    for(i=0;i<(LcmXPixel*LcmYPixel/8/n);i++)
    {
        for(j=0;j<n;j++)
        {
            WriteData( x );
        }
        x=~x;
    }
}

```

//主函数

void Main(void)

```

{
    RES = 0;
    DelayMS(200); //不论是否使用 RESET 脚进行复位,延时都保留.
    RES = 1;
    DelayMS(200);
    LcmInit();
    FillBMP(0);
    while(1)
    {
        PutBmp(bmp1); //图形
        DelayKey(1,5);
        PutDots(0x33,2); //网点
        DelayKey(1,5);
        PutDots(0xcc,2); //网点
        DelayKey(1,5);
        PutDots(0xf0,4); //网点
        DelayKey(1,5);
        PutDots(0x0f,4); //网点
        DelayKey(1,5);
    }
}

```

```

}
)
Uchar code bmp1[]={
/*-- 调入了一个图像: E:\Program\Bmp_Sample\240128.bmp --*/
/*-- 宽度 x 高度=240x128 --*/
0xFF, 0x80, 0x80, 0x80, 0x80, 0x80, 0x80, 0x80, 0x80, 0x80, 0x80, 0x80, 0x80, 0x80, 0x80, 0x80,
0x80, 0x80, 0x80, 0x80, 0x80, 0x80, 0x80, 0x80, 0x80, 0x80, 0x80, 0x80, 0x80, 0x80, 0x80, 0x80,
0x80, 0x80, 0x80, 0x80, 0x8F, 0x9F, 0x9F, 0x9F, 0x9F, 0x9F, 0x9E, 0x9E, 0x9F, 0x9F, 0x9F, 0x9F, 0x9F,
0x9F, 0x9F, 0x9F, 0x9F, 0x9F, 0x9F, 0x9F, 0x9F, 0x87, 0x83, 0x83, 0x83, 0x81, 0x80,
0x80, 0x80, 0x80, 0x80, 0x80, 0x80, 0x83, 0x87, 0x86, 0x86, 0x86, 0x83, 0x83, 0x81, 0x81,
0x80, 0x80, 0x80, 0x80, 0x81, 0x81, 0x81, 0x81, 0x81, 0x81, 0x81, 0x81, 0x81, 0x81, 0x81, 0x80,
0x80, 0x80, 0x80, 0x80, 0x81, 0x81, 0x83, 0x83, 0x86, 0x86, 0x86, 0x87, 0x83, 0x80, 0x80, 0x80,
0x80, 0x80, 0x80, 0x80, 0x80, 0x80, 0x80, 0x80, 0x81, 0x81, 0x83, 0x83, 0x83, 0x83, 0x81,
0x81, 0x81, 0x81, 0x80, 0x80, 0x80, 0x80, 0x80, 0x80, 0x80, 0x80, 0x80, 0x80, 0x80, 0x80, 0x80,
0x80, 0x80, 0x80, 0x80, 0x80, 0x80, 0x80, 0x80, 0x80, 0x80, 0x80, 0x80, 0x80, 0x80, 0x80,
0x80, 0x80, 0x81, 0x81, 0x81, 0x80, 0x80, 0x80, 0x80, 0x80, 0x80, 0x80, 0x80, 0x80, 0x80, 0x80,
0x80, 0x80, 0x80, 0x80, 0x80, 0x80, 0x80, 0x80, 0x80, 0x80, 0x81, 0x83, 0x82, 0x82, 0x83,
0x81, 0x80, 0x80, 0x80, 0x80, 0x80, 0x80, 0x80, 0x80, 0x80, 0x80, 0x80, 0x80, 0x80, 0x80, 0x80,
0x80, 0x80, 0x80, 0x80, 0x80, 0x80, 0x80, 0x80, 0x81, 0x81, 0x83, 0x83, 0x83, 0x83, 0x83,
0x81, 0x81, 0x81, 0x80, 0x80, 0x80, 0x80, 0x80, 0x80, 0x80, 0x80, 0x80, 0x80, 0x80, 0x80, 0xFF,
0xFF, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00,
0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x01, 0x01, 0x02, 0x02, 0x02,
0x0F, 0x3F, 0x3F, 0x7F, 0xFF, 0xFF, 0xFF, 0xFF, 0x1F, 0x00, 0x00, 0x98, 0x98, 0x80,
0x80, 0x80, 0x98, 0x98, 0xC0, 0x80, 0x00, 0x07, 0x0F, 0x9F, 0xFF, 0xFF, 0xFF, 0xFF, 0xFF,
0x0F, 0x07, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0xF0, 0xFC, 0x0F, 0x03, 0x01, 0x07, 0x0F, 0x0F,
0x7F, 0xFF, 0xFF, 0xFF, 0xFF, 0xFF, 0xFF, 0xFF, 0xFF, 0xFF, 0xFF, 0xFF, 0xFF, 0xFF, 0xFF,
0xFF, 0xFF, 0xFF, 0xFF, 0xFF, 0x9F, 0x0F, 0x03, 0x01, 0x01, 0x07, 0xFE, 0xF8, 0x00, 0x00, 0x00,
0x00, 0x03, 0x04, 0x18, 0x3B, 0x3C, 0x58, 0xD3, 0x94, 0x98, 0x97, 0x98, 0x90, 0xDF, 0xC8, 0xC8,
0xA4, 0x96, 0x8B, 0xC0, 0x70, 0x38, 0x0F, 0x01, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00,
0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x01, 0x0F, 0x18, 0x30,
0x63, 0xC7, 0x9F, 0x9F, 0xCF, 0xE3, 0x70, 0x38, 0x1E, 0x0F, 0x07, 0x03, 0x03, 0x03, 0x03, 0x03,
0x03, 0x03, 0x03, 0x03, 0x03, 0x07, 0x1E, 0x38, 0x60, 0xC7, 0x9F, 0x3F, 0x7F, 0x3F, 0x0F,
0xC0, 0xF8, 0x3E, 0x0F, 0x02, 0x06, 0x04, 0x0C, 0x0C, 0x06, 0x06, 0x07, 0x03, 0x01, 0x00, 0x00,
0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x7C, 0xFF, 0xC7, 0x81, 0x00, 0x00, 0x00, 0x00, 0x00,
0x80, 0xC0, 0xC0, 0xC0, 0x60, 0x70, 0x38, 0x1F, 0x07, 0x00, 0x00, 0x00, 0x00, 0x00, 0xFF,
0xFF, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00,
0x00, 0x00, 0x00, 0x00, 0x00, 0x03, 0x3C, 0x40, 0x80, 0x80, 0x00, 0x00, 0x00, 0x0F,
0x3F, 0xFF, 0xFF, 0xFF, 0xFF, 0xE0, 0xC0, 0x80, 0x00, 0x00, 0x00, 0x00, 0x18, 0x28,
0x28, 0x38, 0x18, 0x00, 0x00, 0x00, 0x80, 0xC0, 0xE0, 0xF8, 0xFF, 0xFF, 0xFF, 0xFF, 0xFF,
0xDF, 0x8F, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00,
0xF8, 0xF8, 0xF8, 0xF9, 0xF8, 0xFC, 0xFF, 0xFF, 0xFF, 0xFF, 0xFF, 0xFF, 0xFF, 0xFF, 0xFF, 0xF8,
0xF8, 0xF8, 0xF8, 0xF8, 0xFC, 0xFE, 0xFF, 0xFF, 0xFF, 0xFF, 0x9F, 0x00, 0x00, 0x00, 0x00,
0x00, 0x00, 0x00, 0x00, 0x20, 0x10, 0xF0, 0x1F, 0x3F, 0xFA, 0x7D, 0x3F, 0xFC, 0x60, 0x20, 0xFA, 0x7D,
0x78, 0x3C, 0x1F, 0xFF, 0x3F, 0x00, 0xC7, 0xFF, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00,
0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x07, 0x3F, 0xD8, 0x00, 0x00, 0x00,
0xC0, 0xC0, 0xC0, 0xC9, 0xCA, 0xCA, 0xA0, 0xA0, 0x15, 0x08, 0xA0, 0x90, 0x80, 0x80, 0x80, 0x80,
0x80, 0x80, 0x80, 0x80, 0x80, 0x90, 0x20, 0x08, 0x15, 0x0A, 0x8A, 0x8A, 0x8A, 0x89, 0x80, 0x80,
0x00, 0x00, 0x00, 0xFC, 0x7F, 0x61, 0x7C, 0x40, 0x7C, 0x00, 0x38, 0x20, 0x83, 0xFF, 0x30, 0x00,
0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x0C, 0x0E, 0x8E, 0xC7, 0xC7, 0x07, 0x03, 0x01, 0x01,
0x01, 0x00, 0x00, 0x00, 0x00, 0x60, 0x60, 0xE0, 0xE0, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0xFF,
0xFF, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x0F, 0x3F, 0x3F, 0x3F, 0x3F, 0x1F,
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0x80, 0xF3, 0xF8, 0xFC, 0xFC, 0xFD, 0x7F, 0x3F, 0x1F, 0x0F, 0x07, 0x03, 0x03, 0x03, 0x03, 0x03,
0x03, 0x01, 0x01, 0x03, 0x03, 0x07, 0x0F, 0x1F, 0x3F, 0x7F, 0xFF, 0xFF, 0xFF, 0xFF, 0xFE,
0xF8, 0x80, 0x00, 0x00, 0x00, 0x00, 0x00, 0x10, 0x40, 0x41, 0xE1, 0xFB, 0xFE, 0xFE, 0xFF, 0x1F, 0x0F,
0x07, 0x07, 0xC7, 0xE7, 0xCF, 0x1F, 0xFF, 0xFF, 0xFB, 0xF3, 0xF3, 0xFB, 0xFF, 0x3F, 0x4F, 0xE7,
0xE7, 0x47, 0x07, 0x07, 0x0F, 0x1F, 0xFF, 0xFF, 0xFF, 0xF9, 0xE0, 0x20, 0x20, 0x20, 0x20, 0x20,
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0x00, 0x00, 0x00, 0xE0, 0x10, 0x48, 0xE8, 0xE8, 0x48, 0x10, 0xE0, 0x00, 0x00, 0x00, 0x00, 0x00,
0x01, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0xE0, 0x10, 0x48, 0xE9, 0xE9, 0x49, 0x11, 0xE1, 0x01,
0x01, 0x01, 0x02, 0x00, 0x80, 0xFF, 0x3F, 0x00, 0x00, 0x00, 0x00, 0x80, 0xFD, 0x1F, 0x01,
0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x01, 0x01, 0x01, 0xC1, 0xFF, 0xFF, 0xC3,
0xE2, 0xE6, 0x76, 0x76, 0x3C, 0x3C, 0x1C, 0x1C, 0x08, 0x00, 0x00, 0x00, 0x00, 0x00, 0xFF,
0xFF, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x80, 0x80, 0x80, 0x80, 0x80, 0x40,
0x40, 0x40, 0xC0, 0x40, 0x80, 0x00, 0x00, 0x7F, 0x00, 0x00, 0x00, 0x00, 0x00, 0x6E, 0x80, 0x00,
0x00, 0xF9, 0x00, 0x00, 0x00, 0x80, 0xC3, 0xEB, 0xE0, 0xFF, 0xE0, 0xC0, 0xF0, 0xF0, 0xFB,
0xF8, 0xF8, 0xF8, 0xF7, 0xE0, 0xE0, 0xF0, 0xF0, 0xFF, 0xE0, 0xE0, 0xC0, 0x00, 0x00, 0x00, 0x00,
0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x20, 0x80, 0x80, 0x01, 0x00, 0x00, 0x00, 0x80, 0x80,
0xC0, 0xC0, 0xE0, 0xE0, 0xFF, 0xE6, 0xE6, 0xE7, 0xE7, 0xE7, 0xE7, 0xE7, 0xE6, 0xFF, 0xE7,
0xE0, 0xE0, 0xE0, 0xC0, 0xC0, 0x80, 0x80, 0x00, 0x00, 0x00, 0x80, 0x80, 0x40, 0x40, 0x00, 0x00,
0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x04,
0x24, 0x7F, 0x50, 0xA0, 0xC0, 0x80, 0x00, 0x80, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00,
0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0xC0, 0xF8, 0xFC, 0x1F, 0x07, 0x03, 0xA8,
0x94, 0x94, 0x94, 0x94, 0x94, 0x94, 0x92, 0x92, 0x49, 0x00, 0x00, 0x00, 0x00, 0x03, 0xE6,
0xFC, 0xF8, 0xE6, 0xE1, 0x00, 0x00, 0x00, 0x00, 0x00, 0x90, 0x22, 0x24, 0x24, 0x28, 0x28, 0x28,
0x28, 0x28, 0x51, 0x03, 0x0E, 0xF0, 0xC0, 0x00, 0x00, 0xC0, 0x00, 0x00, 0xF8, 0xFD, 0xFF, 0xD0,
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0x00, 0x00, 0x00, 0x00, 0x00, 0x03, 0x03, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0xFF,
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0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0xC0,
0x00, 0x80, 0x40, 0x40, 0x61, 0x41, 0x60, 0x70, 0x40, 0x00, 0xD4, 0x0E, 0x06, 0x06, 0x54, 0xBC,
0x00, 0x70, 0x48, 0xC8, 0x04, 0x08, 0x04, 0x04, 0x8C, 0x48, 0x30, 0x00, 0x00, 0x00, 0x00, 0x00,
0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0xC0, 0xE0, 0x70, 0x18, 0x0C, 0x06, 0x06,

```



0x06, 0x06, 0x06, 0x06, 0x0C, 0xF8, 0xFC, 0x3F, 0xCF, 0xEF, 0xE7, 0xE7, 0xCF, 0x1C, 0xFC, 0xFC,
0xFC, 0xFC, 0xFC, 0xF8, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00,
0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00,
0x3F, 0xE0, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00,
0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x83, 0xFF, 0xFC,
0x7E, 0x3F, 0x1F, 0x1F, 0x0F, 0x07, 0x07, 0x07, 0x27, 0x63, 0x63, 0x63, 0xC3, 0xC3, 0x83, 0x03,
0x03, 0x03, 0x07, 0x07, 0x87, 0xC7, 0x67, 0x67, 0x67, 0x0F, 0x0F, 0x1F, 0x1F, 0x3F, 0x3F,
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0x1E, 0x07, 0x03, 0x01, 0x01, 0x01, 0xC3, 0xFF, 0x7C, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0xFF,
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0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x03, 0x03, 0x3F, 0x3F, 0x3F, 0x3F, 0x3F, 0x3F, 0x3F,
0x6F, 0x4F, 0xCF, 0x87, 0x87, 0x87, 0xCF, 0x7F, 0x1F, 0x0F, 0x0F, 0x07, 0x00, 0x00, 0x00, 0x00,
0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00,
0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x03, 0x03, 0x06, 0x04, 0x04,
0x04, 0x04, 0x06, 0x03, 0x03, 0x06, 0x06, 0xC6, 0xE6, 0xE6, 0xE6, 0xE6, 0xE6, 0x66, 0x06, 0x0F,
0x0C, 0x18, 0x13, 0x11, 0x11, 0x0B, 0x0E, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00,
0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x60, 0xA0, 0x20, 0x20, 0xE0, 0x10, 0x10,
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11. USING LCD MODULES

11-1. Liquid Crystal Display Modules

LCD is composed of glass and polarizer. Pay attention to the following items when handling.

(1) Please keep the temperature within specified range for use and storage. Polarization degradation, bubble generation or polarizer peel-off may occur with high temperature and high humidity.

(2) Do not touch, push or rub the exposed polarizers with anything harder than an HB pencil lead (glass, tweezers, etc.).

(3) N-hexane is recommended for cleaning the adhesives used to attach front/rear polarizers and reflectors made of organic substances which will be damaged by chemicals such as acetone, toluene, ethanol and isopropylalcohol.

(4) When the display surface becomes dusty, wipe gently with absorbent cotton or other soft material like chamois soaked in petroleum benzin. Do not scrub hard to avoid damaging the display surface.

(5) Wipe off saliva or water drops immediately, contact with water over a long period of time may cause deformation or color fading.

(6) Avoid contacting oil and fats.

(7) Condensation on the surface and contact with terminals due to cold will damage, stain or dirty the polarizers. After products are tested at low temperature they must be warmed up in a container before coming is contacting with room temperature air.

(8) Do not put or attach anything on the display area to avoid leaving marks on.

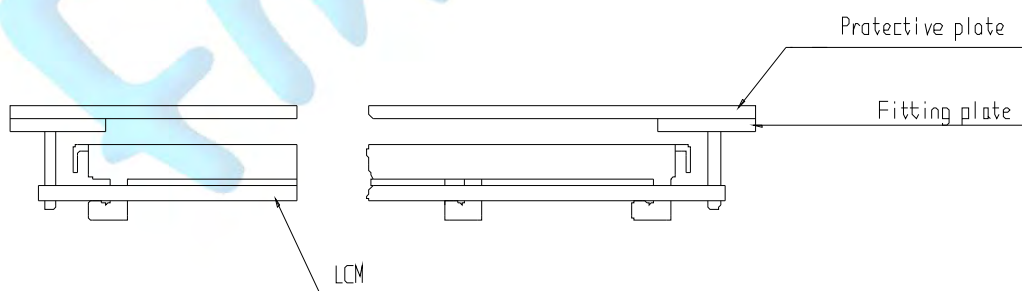
(9) Do not touch the display with bare hands. This will stain the display area and degradate insulation between terminals (some cosmetics are determinated to the polarizers).

(10) As glass is fragile. It tends to become or chipped during handling especially on the edges. Please avoid dropping or jarring.

11-2. Installing LCD Modules

The hole in the printed circuit board is used to fix LCM as shown in the picture below. Attend to the following items when installing the LCM.

(1) Cover the surface with a transparent protective plate to protect the polarizer and LC cell.



(2) When assembling the LCM into other equipment, the spacer to the bit between the LCM and the fitting plate should have enough height to avoid causing stress to the module surface, refer to the individual specifications for measurements. The measurement tolerance should be $\pm 0.1\text{mm}$.

11-3. Precaution for Handling LCD Modules

Since LCM has been assembled and adjusted with a high degree of precision, avoid applying excessive shocks to the module or making any alterations or modifications to it.

(1) Do not alter, modify or change the shape of the tab on the metal frame.

(2) Do not make extra holes on the printed circuit board, modify its shape or change the

positions of components to be attached.

(3) Do not damage or modify the pattern writing on the printed circuit board.

(4) Absolutely do not modify the zebra rubber strip (conductive rubber) or heat seal connector.

(5) Except for soldering the interface, do not make any alterations or modifications with a soldering iron.

(6) Do not drop, bend or twist LCM.

LCM is easy to be damaged. Please note below and be careful for handling.

Correct handling:



As above picture, please handle with anti-static gloves around LCM edges.

Incorrect handling:



Please don't touch IC directly.



Please don't stack LCM.



Please don't hold the surface of panel.



Please don't stretch interface of output, such as FPC cable.





Please don't hold the surface of IC.



Please don't operate with sharp stick such as pens.

11-4. Electro-Static Discharge Control

Since this module uses a CMOS LSI, the same careful attention should be paid to electrostatic discharge as for an ordinary CMOS IC.

- (1) Make certain that you are grounded when handling LCM.
- (2) Before remove LCM from its packing case or incorporating it into a set, be sure the module and your body have the same electric potential.
- (3) When soldering the terminal of LCM, make certain the AC power source for the soldering iron does not leak.
- (4) When using an electric screwdriver to attach LCM, the screwdriver should be of ground potentiality to minimize as much as possible any transmission of electromagnetic waves produced sparks coming from the commutator of the motor.
- (5) As far as possible make the electric potential of your work clothes and that of the work bench the ground potential.
- (6) To reduce the generation of static electricity be careful that the air in the work is not too dried. A relative humidity of 50%-60% is recommended.

11-5. Precaution for soldering to the LCM

- (1) Observe the following when soldering lead wire, connector cable and etc. to the LCM.
 - Soldering iron temperature : $280^{\circ}\text{C} \pm 10^{\circ}\text{C}$.
 - Soldering time : 3-4 sec.
 - Solder : eutectic solder.

If soldering flux is used, be sure to remove any remaining flux after finishing to soldering operation. (This does not apply in the case of a non-halogen type of flux.) It is recommended that you protect the LCD surface with a cover during soldering to prevent any damage due to flux spatters.

- (2) When soldering the electroluminescent panel and PC board, the panel and board should not be detached more than three times. This maximum number is determined by the temperature and time conditions mentioned above, though there may be some variance depending on the temperature of the soldering iron.
- (3) When remove the electoluminescent panel from the PC board, be sure the solder has completely melted, the soldered pad on the PC board could be damaged.

11-6. Precautions for Operation

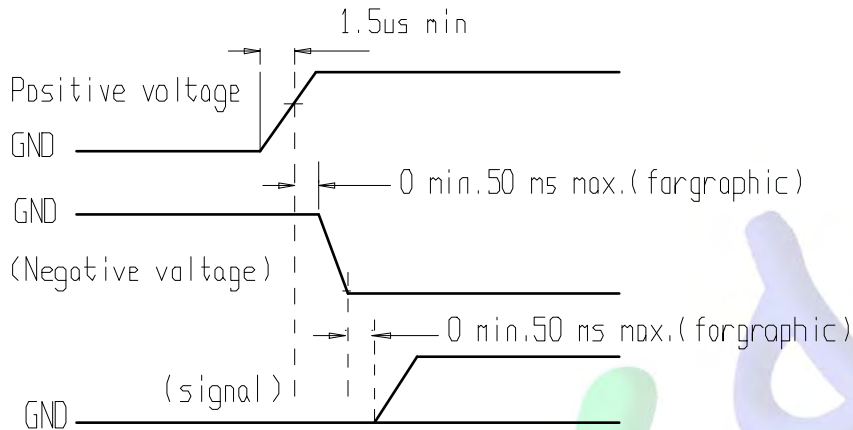
- (1) Viewing angle varies with the change of liquid crystal driving voltage (VO). Adjust VO to show the best contrast.
- (2) Driving the LCD in the voltage above the limit shortens its life.
- (3) Response time is greatly delayed at temperature below the operating temperature range. However, this does not mean the LCD will be out of the order. It will recover when it returns to

the specified temperature range.

(4) If the display area is pushed hard during operation, the display will become abnormal. However, it will return to normal if it is turned off and then back on.

(5) Condensation on terminals can cause an electrochemical reaction disrupting the terminal circuit. Therefore, it must be used under the relative condition of 40°C , 50% RH.

(6) When turning the power on, input each signal after the positive/negative voltage becomes stable.



11-7. Storage

When storing LCDs as spares for some years, the following precaution are necessary.

- (1) Store them in a sealed polyethylene bag. If properly sealed, there is no need for dessicant.
- (2) Store them in a dark place. Do not expose to sunlight or fluorescent light, keep the temperature between 0°C and 35°C.
- (3) The polarizer surface should not come in contact with any other objects. (We advise you to store them in the container in which they were shipped.)
- (4) Environmental conditions :
 - Do not leave them for more than 168hrs. at 60°C.
 - Should not be left for more than 48hrs. at -20°C.

11-8. Safety

- (1) It is recommended to crush damaged or unnecessary LCDs into pieces and wash them off with solvents such as acetone and ethanol, which should later be burned.
- (2) If any liquid leaks out of a damaged glass cell and comes in contact with the hands, wash off thoroughly with soap and water.

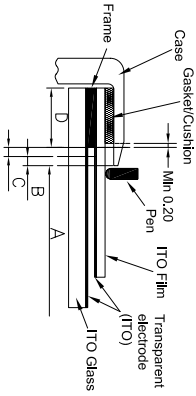
11-9. Return LCM under warranty

No warranty can be granted if the precautions stated above have been disregarded. The typical examples of violations are :

- Broken LCD glass.
- PCB eyelet's damaged or modified.
- PCB conductors damaged.
- Circuit modified in any way, including addition of components.
- PCB tampered with by grinding, engraving or painting varnish.
- soldering to or modifying the bezel in any manner.

Module repairs will be invoiced to the customer upon mutual agreement. Modules must be returned with sufficient description of the failures or defects. Any connectors or cable installed by the customer must be removed completely without damaging the PCB eyelet's, conductors and terminals.

Structure and Area definition



A: Active area

The area which guarantees a touch panel operation with following characteristics when passed.

- (1) Operation force, (2) Electric characteristics,
- (3) Tapping durability, (4) Pen sliding durability.

B: operation non-guaranteed area

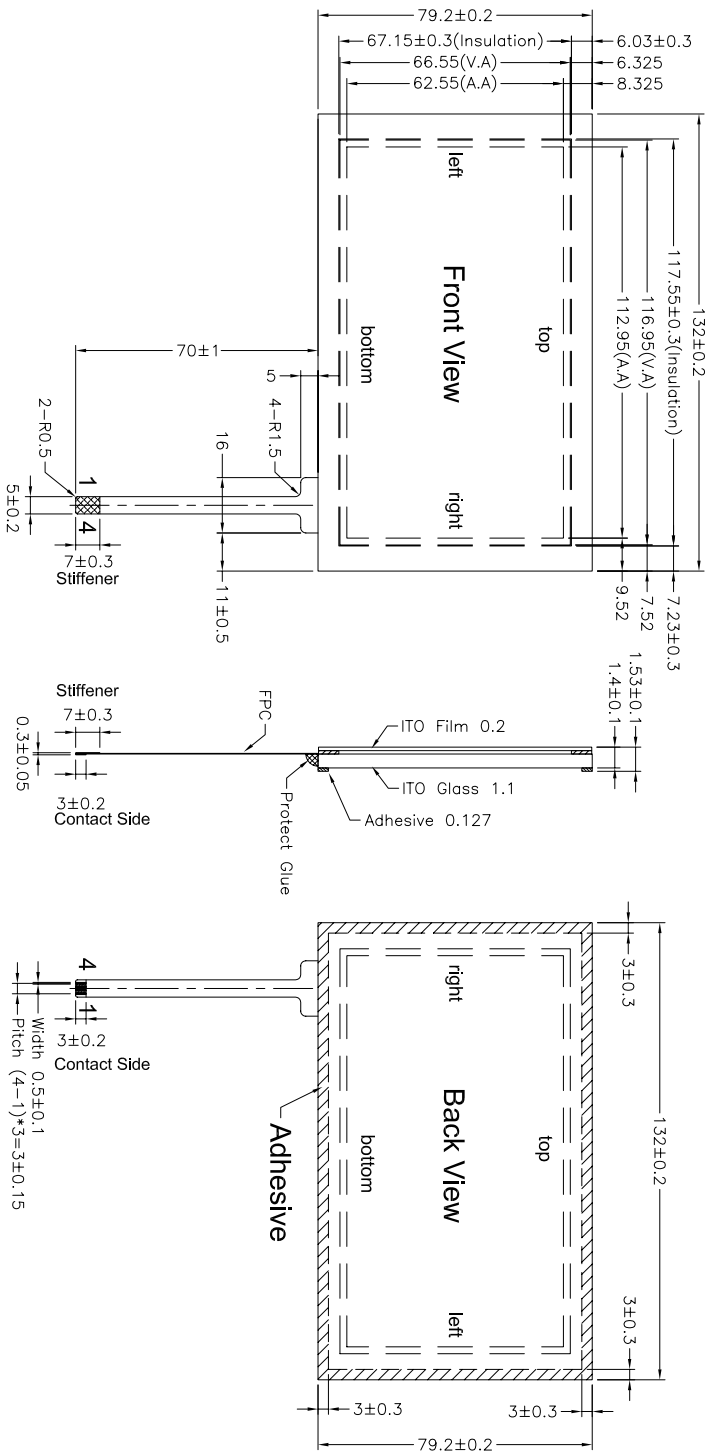
The area which does not guarantee a touch panel operation and its function. When this area is pressed touch panel shows degradation of its performance and durability such as a pen sliding durability becomes about one-tenth compared with the active area(A) as guaranteed area and its operation force requires about double. About 0.5mm outside from a boundary of the active corresponds to this area.

C: Pressing prohibition area.

The area which forbids pressing because an excessive load is applied a transparent electrode and a serious damage is given to touch panel function by pressing.

D: Non-Active area

The area which does not activate even if passed.



- NOTES:**
1. Operation Temperature: -10°C ~ +60°C.
Storage Temperature: -20°C ~ +70°C.
 2. Time Life > 1,000,000 Times.
 3. Linearity: $\leq \pm 1.5\%$.
 4. ITO Film: Anti-glare Hard Coating And Anti-newton Ring; Sheet Resistance: 450 \pm 100 Ω ;
ITO Glass: Sheet Resistance: 500 \pm 100 Ω ;
 5. Tail Type :FPC By Gold Plated.
 6. Surface hardness : $\geq 3H$.
 7. Unspecified Tolerance: ± 0.2

Pin#	Assignment
1	left
2	bottom
3	right
4	top

UNIT	TOLERANCES:	DATE	TITLE: TP Characteristics
MM	ANGLES $\pm 1'$	2010-02-03	TP PART NO. RFP053001A-GR
3RD ANGLE	MM ± 0.2	2010-02-03	CUST. PART NO.
NOT IN SCALE	NAME	2010-02-03	LCM PART NO.
DRAWN BY: WH Chen	DATE	2010-02-03	REV: A
CHECKED BY: Frank zhu	DATE	2010-02-03	Page: 1 of 1
APPROVED BY:	DATE		

