ILLUMINANT 北極光企業有限公司

PRODUCT SPECIFICATION FOR LCM

CUSTOMER:	
MODEL NO:	IG-G090601-6WFLWA
ACCEPTED BY:	

APPROVED BY:	CHECKED BY:	ORGANIZED BY:
LCM產品部 2007.09.29 贺秋芳	LCM產品部 2007.09.29 隆茂生	LCM產品部 2007.09.29 隆茂生

□Approval for Specifications Only

■Approval for Specifications and Sample

Note: 1. Version of Specifications : 1

2. Others: Rohs Compliment

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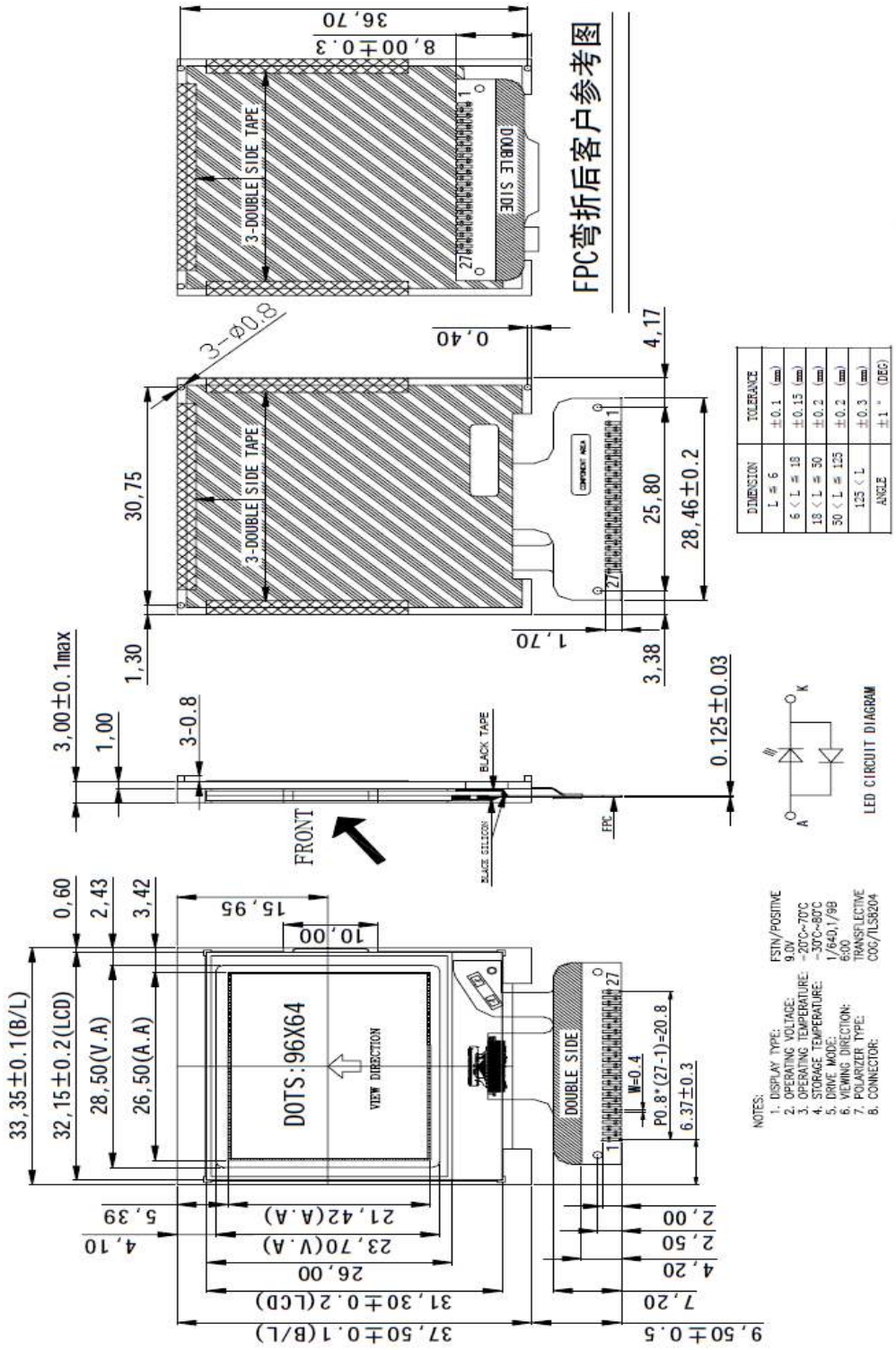
RECORD OF REVISION

REV	COMMENT	PAGE	DATE
A	Initial Release	1-28	2007-08-28
B	Amend pillar seat	5	2007-09-29

GENERAL SPECIFICATION

ITEM	CONTENTS
Module Size	33.35(W) × 47.0(H) ×3.0(T) mm
Display Format	96(W) ×64(H) DOTS
Active Area	28.5(W) × 23.7(H) mm
Dot Size	0.256mm* 0.315 mm
Dot Pitch	0.276mm * 0.335mm
LCD Type	FSTN/ POSITIVE
View Angle	6 O'clock
Controller IC	TLS8204
Duty Ratio	1/64Duty
Bias	1/9Bias
Backlight Driver type	External Power
DC to DC circuit	Build-In
Weight	TBD

LCM DRAWING



ABSOLUTE MAXIMUM RATING (Ta=25℃ VSS=0V)

Item	Symbol	Min.	Type	Max.	Unit	Humidity
Supply Voltage for Logic	V_{DD}-V_{SS}	-0.3		3.6	Volt	
	V_{DD2}	-0.3	-	3.6	Volt	
Power Supply for LCD	VLCD	-0.3	-	13.5	Volt	
Input Voltage	VIN	-0.3	-	VLCD	Volt	
Operating Temperature	Top	-20	-	+70	℃	Note1
Storage Temperature	T_{ST}	-30	-	+80	℃	Note2

Note1: Background color changes slightly depending on ambient temperature. This phenomenon is reversible.

Ta≦70℃: 75%RH max

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

Note2: Ta at -30℃ will be <48hrs, at 80 ℃ will be <120hrs when humidity is higher than 75%RH.

Ta≦80℃: 75%RH max

Ta>80℃: absolute humidity must be lower than the humidity of 75%RH at 70℃

ELECTRO-OPTICAL CHARACTERISTICS (Ta=25℃)

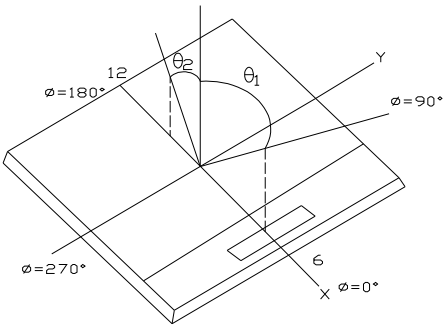
Item	Symbol	Condition	Min.	Typ.	Max.	Unit
Power Supply for Logic	V_{DD}-V_{SS}		1.8	--	3.3	Volt
	V_{DD2}	-	2.4	-	3.3	Volt
Input Voltage	V_{IH}	H level	$0.8V_{DD}$	-	-	Volt
	V_{IL}	L level	-	-	$0.2V_{DD}$	Volt
LCD Module Driving Voltage	VLCD	Ta=25℃	-		10.5	Volt
Power Supply Current for LCM	I_{DD}	V_{DD}=2.8V	-	TBD	TBD	mA

OPTICAL CHARACTERISTICS

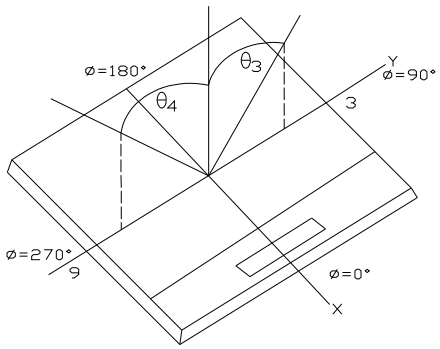
Item		Symbol	Min.	Typ.	Max.	Unit	Condition	Note
Viewing Angle Cr≥2	ψ=0°	θ1	--	35	--	deg.	T=25°C	1.2
	ψ=180°	θ2	--	15	--			
	ψ=90°	θ3	--	25	--			
	ψ=270°	θ4	--	25	--			
Contrast Ratio		Cr	--	15	--	--	T=25°C	3
Response Time (rise)		Tr	--	200	300	ms	T=25°C	4
Response Time (fall)		Tf	--	200	300	ms	T=25°C	4

OPTICAL CHARACTERISTICS DEFINITION

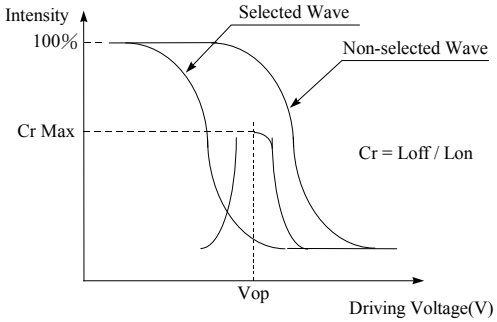
Note 1. Definition of angle θ1&θ2



Note 2. Definition of angleθ3&θ4



Note 3. Definition of contrast ratio (Cr)



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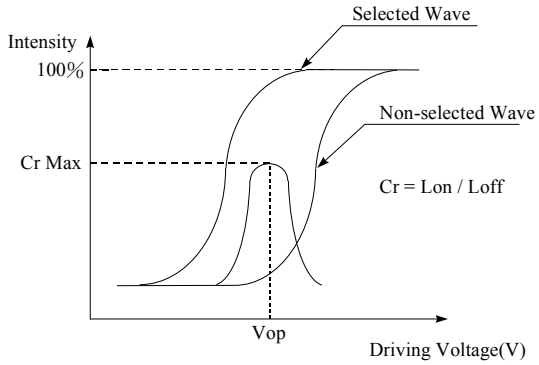
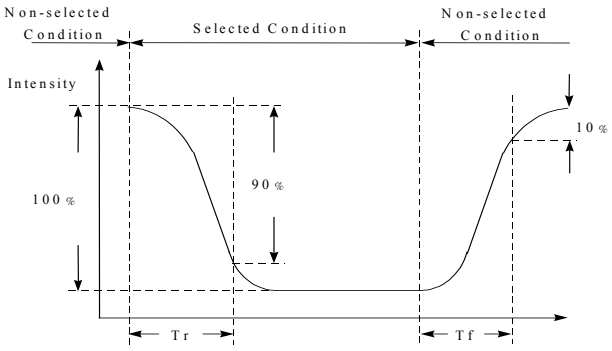
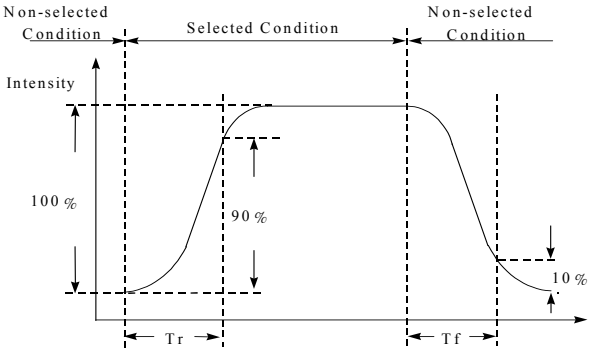


[Negative type]

Note 4. Definition of response time



[positive type]

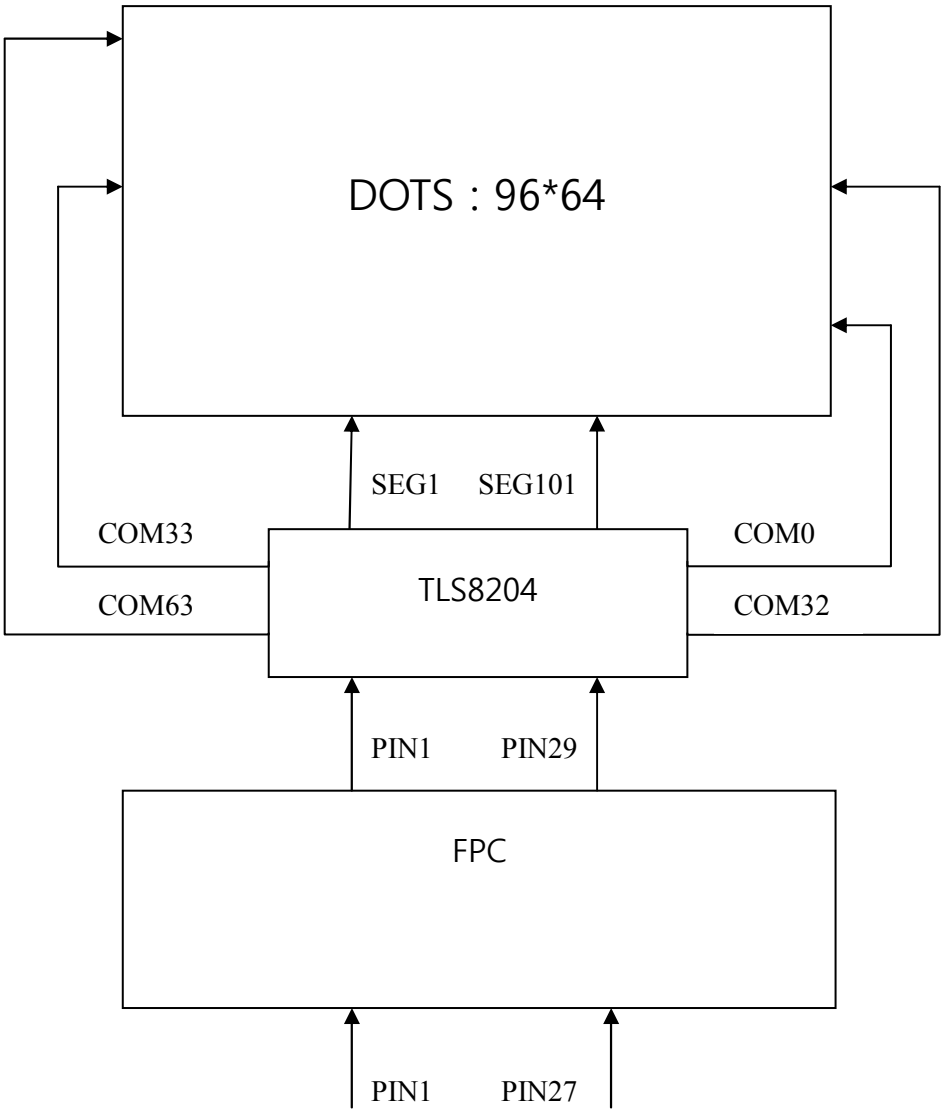


[Negative type]

ITERFACE PIN ASSIGNMENT

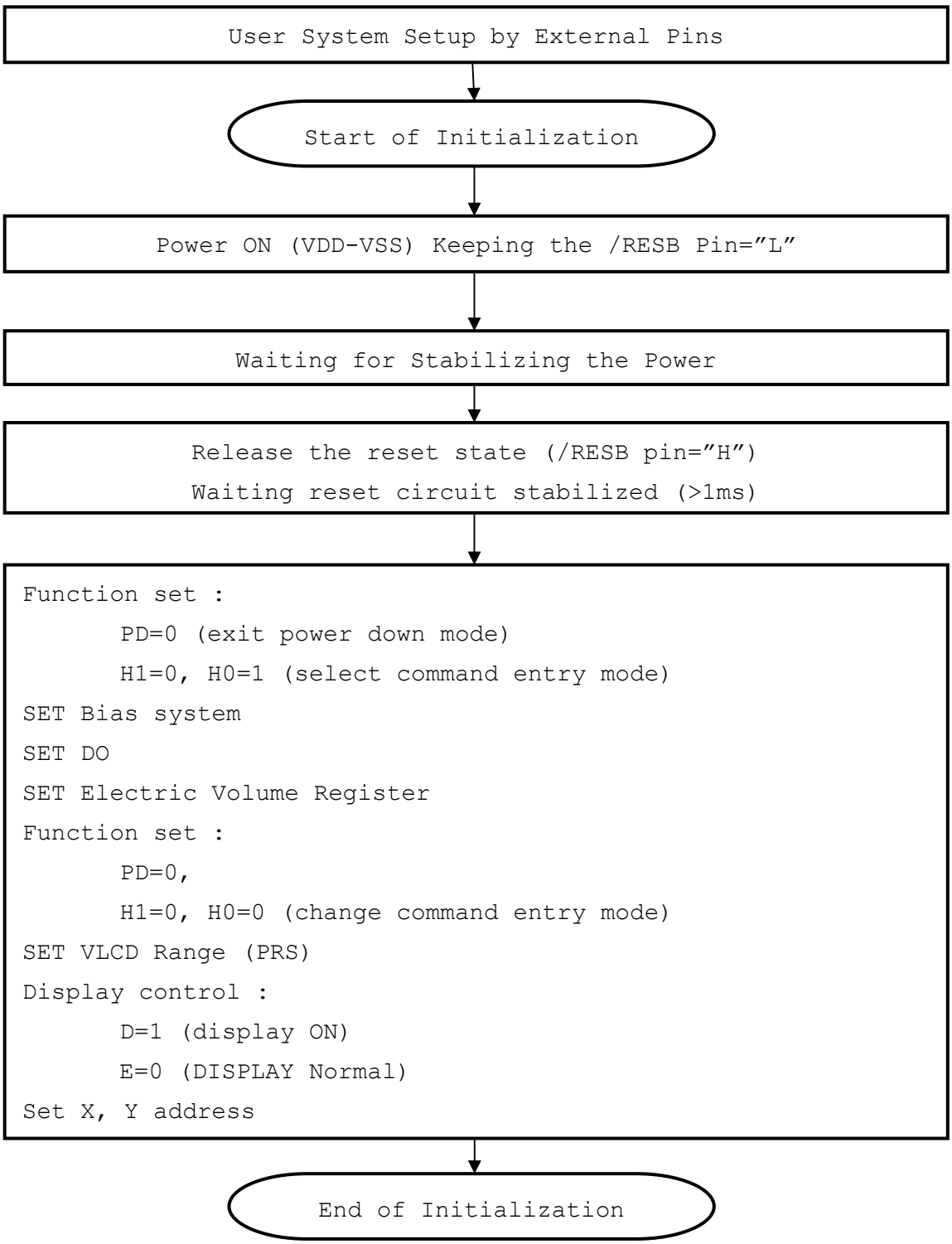
PIN NO.	SYMBOL	FUNCTIONS
1	VDD	Power Supply for Logic Circuits
2	VSS	Ground
3	MPU	8080-series parallel MPU interface / 6800-series parallel MPU interface
4	NC	NC
5	CS1	There are the chip select pins . the chip is set to active when/cs=:"H"
6	RS	Thin pin is used to indicate that whether the data bus is data or command. RS = "H": D7 – D0 are data. RS = "L": D7 – D0 are command
7	RDB	This pin is the enable indicator (6800 interface mode) or the read operation indicator (8080 interface mode).
8	WR	This pin is the read/write indicator (6800 interface mode) or write operation indicator (8080 interface mode).
9	RST	RST
10	D0	Data Bit 0
11	NC	NC
12	D1	Data Bit 1
13	NC	NC
14	D2	Data Bit 2
15	NC	NC
16	D3	Data Bit 3
17	NC	NC
18	D4	Data Bit 4
19	NC	NC
20	D5	Data Bit 5
21	NC	NC
22	D6	Data Bit 6
23	NC	NC
24	D7	Data Bit 7
25	NC	NC
26	LED-	Backlight Power Supply -
27	LED+	Backlight Power Supply +

BLOCK DIAGRAM

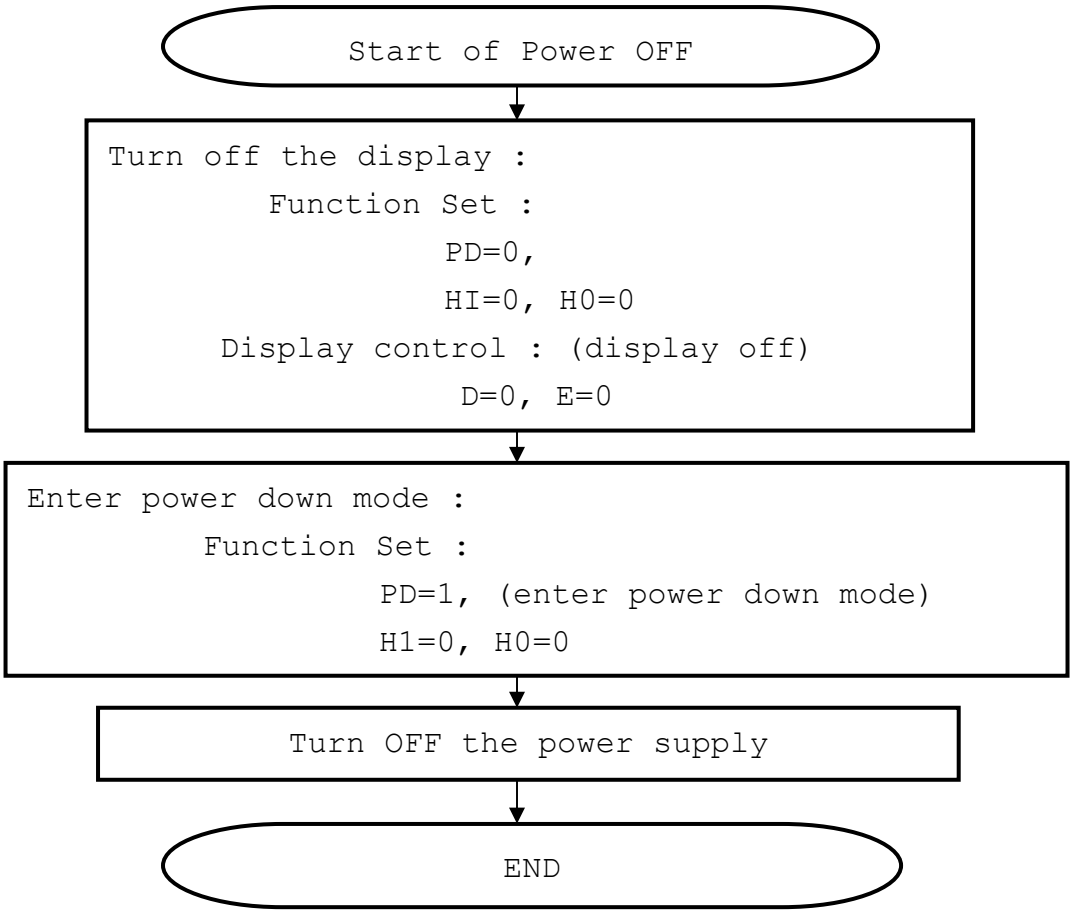


SOFTWARE FLOW

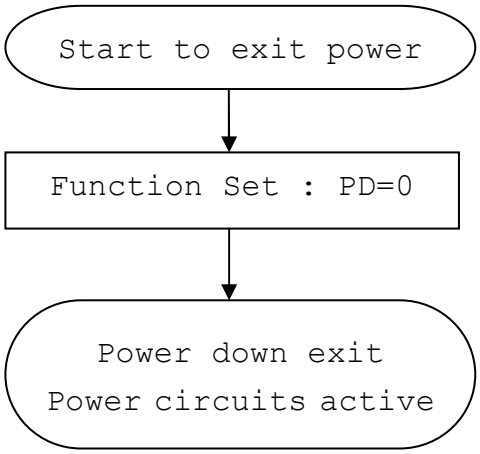
POWER ON COMMAND SEQUENCE



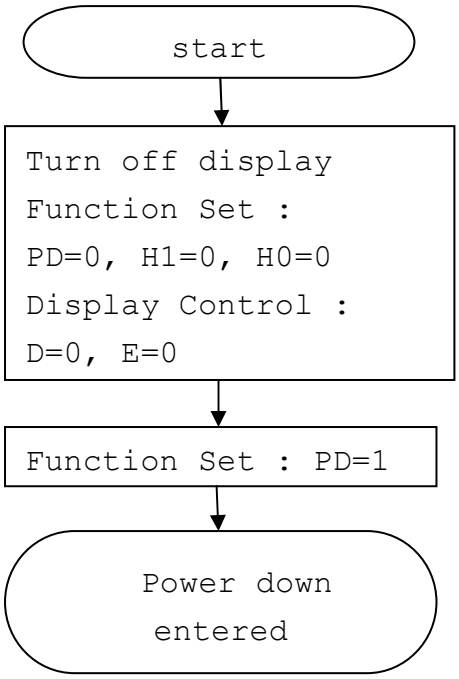
POWER OFF COMMAND SEQUENCE



POWER DOWN MODE EXIT/ENTER POWER DOWN MODE FLOW :



Exit Power Down

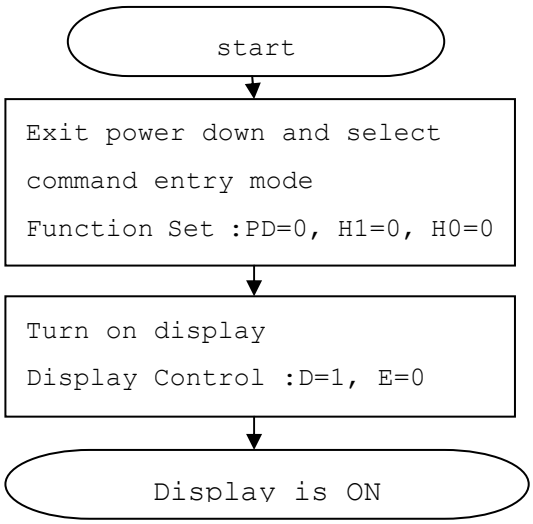


Enter Power Down

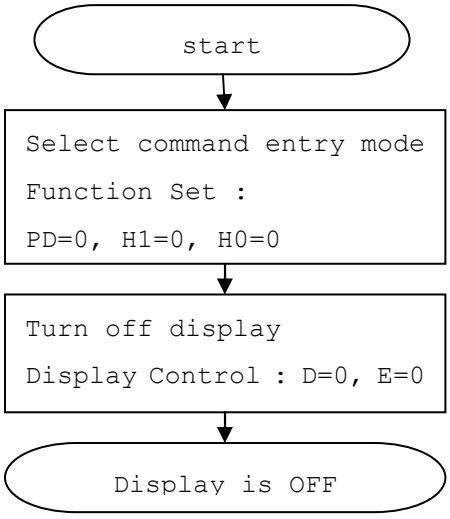
Note : Set display off before enter power down mode is strongly recommended.

DISPLAY ON/OFF MODE

Set display ON/OFF flow :



Set Display ON



Set Display OFF

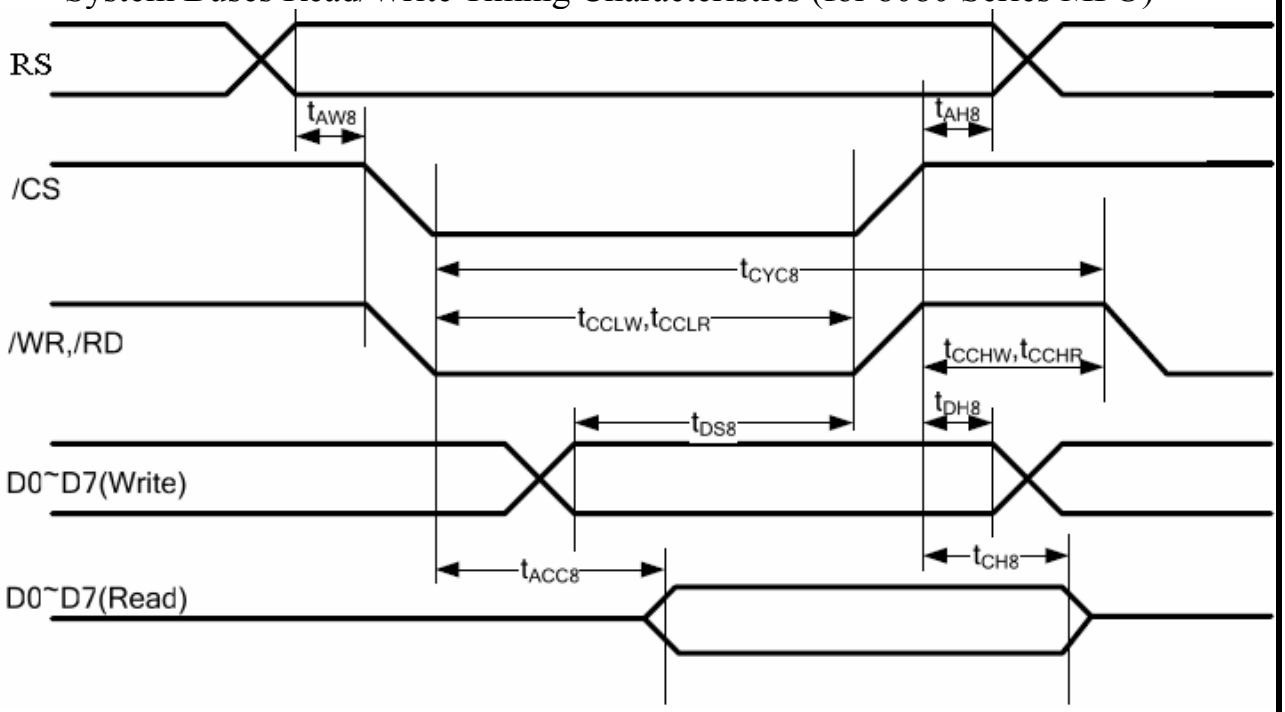
```
void Init()
{
    //////////////////////////// H1 H0=11 ////////////////////////////
       WCom(0x23);//Function Set:MX=0 MY=0 PD=0 ,H1 H0=11
       WCom(0x03);//soft reset
    //////////////////////////// H1 H0=00 ////////////////////////////
       WCom(0x20);//Function Set:MX=0 MY=0 PD=0 ,H1 H0=00
       WCom(0x05);//VLCD range select: PRS=1
       WCom(0x0c);//Sets display configuration:D=1 E=0 Normal display
    //////////////////////////// H1 H0=11 ////////////////////////////
       WCom(0x23);//Function Set:MX=0 MY=0 PD=0 ,H1 H0=11
       WCom(0xb2);//turn off regulator comparator
    //////////////////////////// H1 H0=01 ////////////////////////////
       WCom(0x21);//Function Set:MX=0 MY=0 PD=0 ,H1 H0=01
       WCom(0x04);//Set start line: S6=0
       WCom(0x40);//Set start line: S5 S4 S3 S2 S1 S0=000000
       WCom(0xd5);//Set evr:EV6 EV5 EV4 EV3 EV2 EV1 EV0=1010101
}
void Poweroff ()
{      WCom(0x20);//Function Set:MX=0 MY=0 PD=0 ,H1 H0=00
       WCom(0x08);//Display control(Display off):D=0 E=0
       WCom(0x24);//Function Set:MX=0 MY=0 PD=1 ,H1 H0=00
}
void Powerdown ()
{      WCom(0x20);//Function Set:MX=0 MY=0 PD=0 ,H1 H0=00
       WCom(0x08);//Display control(Display off):D=0 E=0
       WCom(0x24);//Function Set:MX=0 MY=0 PD=1 ,H1 H0=00
}
void Powerdownoff ()
{      WCom(0x20);//Function Set:MX=0 MY=0 PD=0 ,H1 H0=00
    }
```

COMMAND TABLE

H-independent											
Command	**A0**	**WR**	**D_7**	**D_6**	**D_5**	**D_4**	**D_3**	**D_2**	**D_1**	**D_0**	**Description**
NOP	0	0	0	0	0	0	0	0	0	0	No operation
Reserved	0	0	0	0	0	0	0	0	0	1	Do not use
Function Set	0	0	0	0	1	MX	MY	PD	H1	H0	
Read status byte	0	1	PD	0	0	D	E	MX	MY	DO	
Read data	1	1	D_7	D_6	D_5	D_4	D_3	D_2	D_1	D_0	
Write data	1	0	D_7	D_6	D_5	D_4	D_3	D_2	D_1	D_0	
OTP command mode	0	0	0	0	0	0	0	0	1	OM	Enter/exit OTP command mode
H1H0=00											
Command	**A0**	**WR**	**D_7**	**D_6**	**D_5**	**D_4**	**D_3**	**D_2**	**D_1**	**D_0**	**Description**
Set VLCD range	0	0	0	0	0	0	0	1	0	PRS	VLCD range select
End read modify	0	0	0	0	0	0	0	1	1	0	Release read modify write
Read modify write	0	0	0	0	0	0	0	1	1	1	RAM address R:+0; W:+1
Display Control	0	0	0	0	0	0	1	D	0	E	Sets display configuration
Reserved	0	0	0	0	0	1	0	0	*	*	Do not use
Set Y addr of RAM	0	0	0	1	0	0	Y_3	Y_2	Y_1	Y_0	
Set X addr of RAM	0	0	1	X_6	X_5	X_4	X_3	X_2	X_1	X_0	
H1H0=01											
Command	**A0**	**WR**	**D_7**	**D_6**	**D_5**	**D_4**	**D_3**	**D_2**	**D_1**	**D_0**	**Description**
Set start line S6	0	0	0	0	0	0	0	1	0	S6	Set S6 for start line
Display Configure	0	0	0	0	0	0	1	DO	*	*	
System bias set	0	0	0	0	0	1	0	BS2	BS1	BS0	
Set start line	0	0	0	1	S5	S4	S3	S2	S1	S0	Set S5-S0 for start line
Set EVR	0	0	1	EV_6	EV_5	EV_4	EV_3	EV_2	EV_1	EV_0	Set electric volume register
H1H0=10											
Command	**A0**	**WR**	**D_7**	**D_6**	**D_5**	**D_4**	**D_3**	**D_2**	**D_1**	**D_0**	**Description**
Partial screen mode	0	0	0	0	0	0	0	1	0	PS	Partial screen enable
Partial screen size	0	0	0	0	0	0	1	0	0	WS	Set partial screen size
Display part	0	0	0	0	0	1	0	DP_2	DP_1	DP_0	Set display part for PM
H1H0=11											
Command	**A0**	**WR**	**D_7**	**D_6**	**D_5**	**D_4**	**D_3**	**D_2**	**D_1**	**D_0**	**Description**
RESET	0	0	0	0	0	0	0	0	1	1	Software reset
Frame frequency	0	0	0	0	0	0	1	FR_2	FR_1	FR_0	Frame rate control
Set Booster	0	0	0	0	0	1	BE_1	BE_0	PC_1	PC_0	Efficiency & stage
N line inversion	0	0	0	1	0	NL_4	NL_3	NL_2	NL_1	NL_0	Sets N line inversion
Read register/OTP	0	0	1	0	0	0	1	0	0	RO	Select read register or OTP
H-independent, OM=0 (OTP command mode)											
Command	**A0**	**WR**	**D_7**	**D_6**	**D_5**	**D_4**	**D_3**	**D_2**	**D_1**	**D_0**	**Description**
Write OTP data	0	0	0	0	0	0	0	0	0	1	Write the programming data
	0	0	D_7	D_6	D_5	D_4	D_3	D_2	D_1	D_0	
OTP program mode	0	0	1	1	0	0	0	1	0	PRG	Enter/Exit OTP program mode
OTP program enable	0	0	1	1	0	0	0	1	1	PE	OTP program enable
Set OTP address	0	0	1	1	0	0	1	0	PA_1	PA_0	Set OTP programming address

AC CHARACTERISTICS

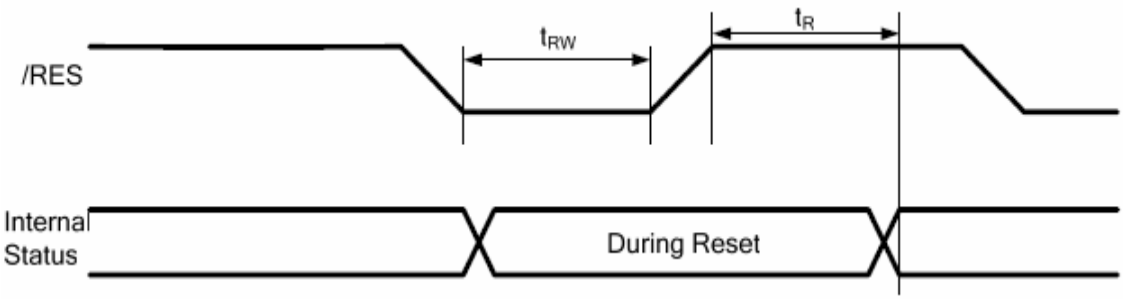
System Buses Read/Write Timing Characteristics (for 8080 Series MPU)



(VDD=3.3V, Ta=-30 to 85°C)

Item	Signal	Symbol	Condition	Rating		Unit
				Min.	Max.	
Address hold time	RS	t_{AH8}		10	--	ns
Address setup time		t_{AW8}		100	--	
System cycle time		t_{CYC8}		400	--	
Enable L pulse width (WRITE)	/WR	t_{CCLW}		80	--	
Enable H pulse width (WRITE)		t_{CCHW}		80	--	
Enable L pulse width (READ)	/RD	t_{CCLR}		140	--	
Enable H pulse width (READ)		t_{CCHR}		80	--	
WRITE Data setup time	D0 to D7	t_{DS8}		80	--	
WRITE Address hold time		t_{DH8}		10	--	
READ Access time		t_{ACCS}	CL=100pF	--	70	
READ Output disable time		t_{OHS}	CL=100pF	5	50	

Reset Timing



(VDD=1.8~3.3V, Ta=25°C)

Item	Symbol	Condition	Rating		Unit
			Min.	Max.	
Reset Time	tR		--	3.0	µs
Reset Low Pulse Width	tRW	/RES	3.0	--	µs

BACKLIGHT

1. Standard Lamp Styles (Edge Lighting Type):
   The LED chips are distributed over the edge light area of the illumination unit, which gives the less power consumption:

2. The Main Advantages of the LED Backlight are as Following:
   2.1 The brightness of the backlight can simply be adjusted.
   By a resistor or a potentiometer.

3. Data About LED Backlight:

Parameter	Sym.	Min.	Typ.	Max.	Unit	Test Condition	Note
Supply Current	I	-	20	--	mA	V	
Forward Voltage	V	-	3.2	3.1	V	IF=20mA -	
Reverse Current	IR	--	--	50	µA	VR=5V	
Luminous Intensity	IV	--	TBD	TBD	Cd/m2	V	
Uniformity	-	--	70	--	%	V	
Wavelength Characteristics	AD	572	--	574	nm	IF=20mA	
Color	WHITE						
Operating Temperature	TOPR	-25 ~ +80					
Storage Temperature	TSTG	-30 ~ +85					

RELIABILITY

Item	Conditions	Hours/Cycle	Ac/Re
Operation Life	Ta= 25℃, If= 20mA	1000 hrs	Accept : Power Decay<50%
High Temperature /High Humidity	Ta=60±5℃； Rh=95±5％	1000 hrs	0/1
High Temperature Storage	Ta= 100±5℃	1000 hrs	0/1
Low Temperature Storage	Ta= -30±5℃	1000 hrs	0/1
Temperature Cycling	85℃～25℃～-30℃～25℃ 30min ~ 5min ~ 30min ~5min	10 cycles	0/1
Thermal Shock	H：85±5℃（10min）～ L：-45±5℃（10min）	10 cycles	0/1
Soldering Resistance	Ta= 240±5℃	5 sec	0/1

RELIABILITY

1.LIFE TIME

It is defined in number of hours of continues operation at 25°C ± 2 °C.
Display lifetime: 30,000 hours
Conditions:
• The unit has to remain operational; In particular, the readability has to be preserved:
• The contrast ratio must not go under 75% of the initial value nor 85% of the minimum value specified above.
• White color must remain in the specification.
• Optical response times could be up to 1.2 x maximum values specified above.
Backlight lifetime (defined at 50% of the initial brightness with typical IF through LED):
15,000 hours.

2. RELIABILITY QUALIFICATION TESTS LIST

This paragraph describes all tests which could have an impact on the display module and are performed by NSBRD to qualify the mobile phone. These constraints should be taken into account for the design of the display module. In addition with supplier standard, NSBRD request the display supplier to perform someof these tests to qualify the display module. The display supplier should review this table and feedback to NSBRD their comments. The duration includes measures before, during and after test.

NO	TEST	CONDITION	CONDITION		SAMPLE
1	Dry heat temperature	Storage	Ta= 80℃	240h	10
2	Cold temperature	Storage	Ta= -30℃	240h	10
3	Temp. change	Storage	stages of 30 min. at +80°C & -30°C ,change 3℃/min	48cycles	10
4	Dry heat temperature	Operating	Ta= + 70℃	240h	5
5	Cold temperature	Operating	Ta= -20℃	240h	5
6	Temp. change	Operating	stages of 30 min. at +70°C & -20°C 3℃/min)48 cycles (change)	48cycles	30
7	Damp heat test	Operating	Ta= 50℃,93%+2%-3%RH (No condensation)	504h	10
8	ESD Test	Operating	Human model norm, Applied voltage : +/-15kV, 150pF, 330Ohm, 3 shots, LCD center, 25°C, coupling surface: half AA surface, normal operating mode		10

3. SANCTIONS AFTER TESTS

•After any test (functional and storage):

• the display has to remain operational (if applicable) with good quality and without any major defect. Reversible marks are allowed, but it should disappear after 1 hour in normal condition.

• The contrast and the transmittance of the unit must remain over 90% of their initial Values:

• All pixels must be operating.

• The ITO in the connection area or connector contact must be free of any corrosion (this control should be done by sampling on 5 pcs coming from Intensive Damp Heat Test).

• The unit must be free of any visual defect described in appendix 1 and 2.

• Electrical consumption variation <100%

INSPECTION STANDARDS

N°	ITEM			Maximum Acceptable Number	Unit	Applied Zone	Inspection Mode	Remarks
1	Dot Defect	White Mode	1 dot	0	pcs	A	Light-On	1),2),4)
			Adjacent dots	0		A		
		Black Mode	1 dot	1	pcs	A		
			Adjacent dots	0		A		
		The total number		1	pcs	A		
2	Line defects			None	-	A	Light-On	-
3	Uneven Brightness : Line Shape			Serious one is not allowed	-	A	Light-On	6)
4	Uneven Brightness : Dot Shape							
5	Stain Inclusion : Line Shape [mm] Width, Length	W<0,01	L : Ignored	Ignore	pcs	A,B	Light-On Light-Off	5),6),7)
		0,01 <W<0,05	L <2,0	1				
			L > 2,0	0				
		0,05<W	-	See Dot shape				
6	Stain Inclusion : Dot Shape [mm] D : Average Diameter	D<0,1		Ignore	pcs	A,B	Light-On Light-Off	5),6),7)
		0,1<D<0,2		1				
		0,2<D		0				
7	Scratch of Polarizer : Line Shape [mm] W : Width, L : Length	W<0,01	L : ingored	Ignore	pcs	A,B	Light-On Light-Off	5),6),7)
		0,01<W<0,05	L<2	1				
			L>2	0				
		0,05<W	-	See dot shape				
8	Scratch of Polarizer : Dot Shape [mm] D:Average Diameter	D<0,1		Ignore	pcs	A,B	Light-On Light-Off	5),6),7)
		0,1<D<0,2		1				
		0,2<D		0				
9	Polarizer : Bubble D : Average Diameter [mm]	D<0,3		Ignore	pcs	A,B	Light-On Light-Off	6)
		0,3<D<0,5		1				
		0,5<D		0				
10	Scratch, Dent of Plastic Mold			Serious one is not allowed	-	C	Light-Off	6)
11	Scratch on FPC			By limited sample	-	C	Light-Off	6)

Note:

1) Defect whose area per each dot is over 50% is regarded as Dot defect.

2) Defect whose brightness at all black screen is more than 30% is regarded as Bright Dot Defect.

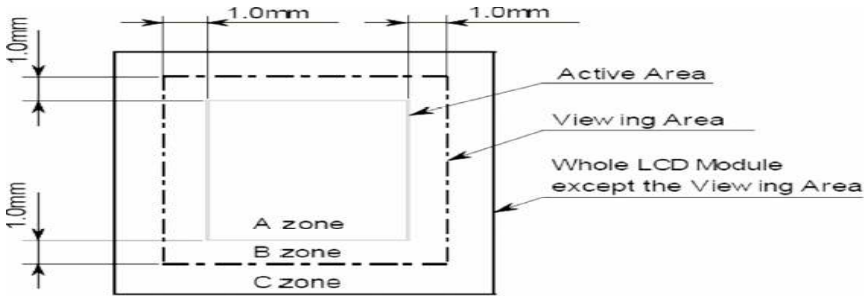
3) Defect whose brightness at all black screen is more than 70% is regarded as Dark Dot Defect.

4) Defect dots which are not adjacent are regarded as single Dot defect each

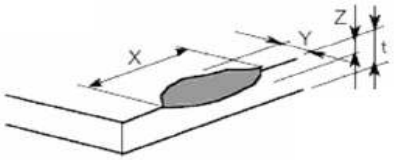
5) Defect which can be easily wiped off is disregarded

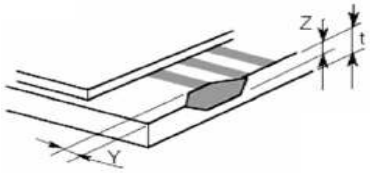
6) In case any problems would be brought out, both parties should discuss needed items such as limited samples

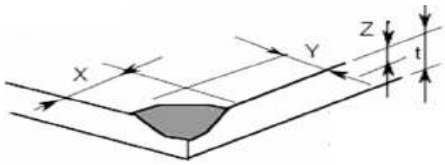
7) In case of grey scale pattern, obvious defect is to be rejected.

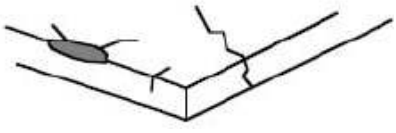


GLASS CRACK

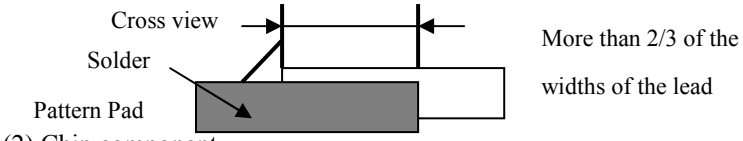
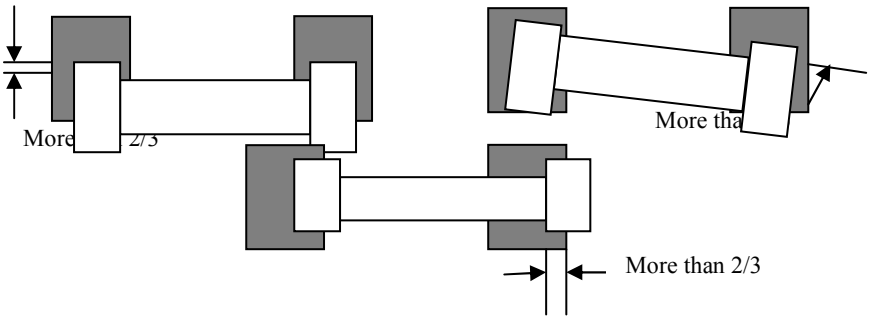
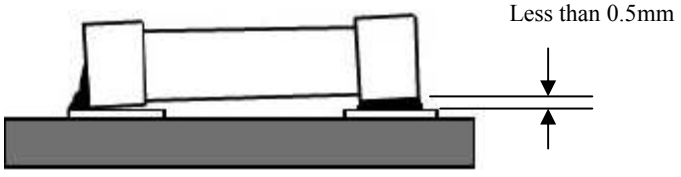
<table>
<tr><td rowspan="3">a. Chipping glass
(cosmetic)</td><td>a. General
 

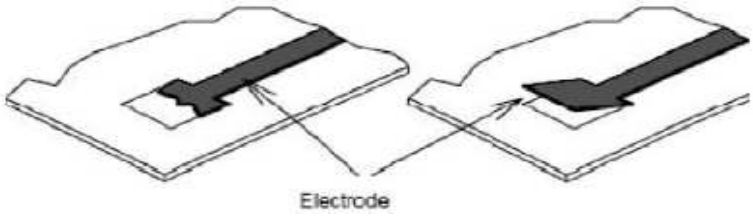
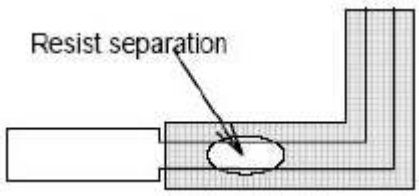
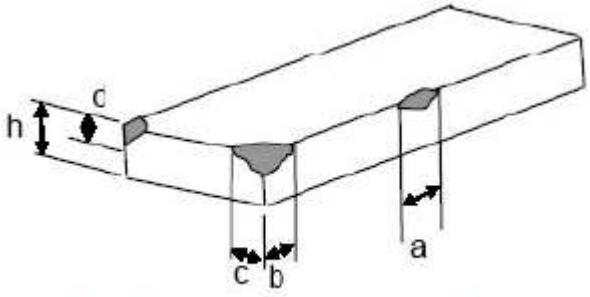
<table>
<tr><td>X</td><td>Y</td><td>Z</td></tr>
<tr><td>≤ 5.0</td><td>≤ 1.5</td><td>≤ t</td></tr>
</table>
* No crack allow ed to reach seal area.
Y ≤ 1, in case of two cracks found.</td></tr>
<tr><td>b. ITO Electrode
 

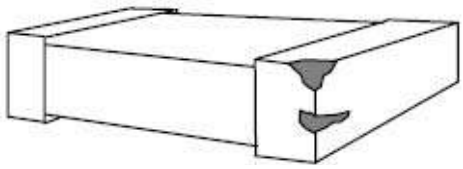
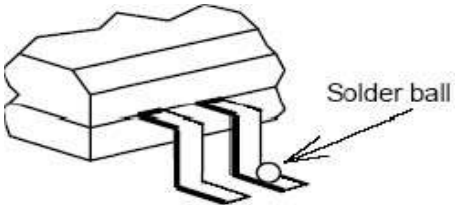
<table>
<tr><td>Y</td><td>Z</td></tr>
<tr><td>≤ 0.45</td><td>≤ t</td></tr>
</table></td></tr>
<tr><td>c. Corner
 

<table>
<tr><td>X</td><td>Y</td><td>Z</td></tr>
<tr><td>≤ 1.5</td><td>≤ 1.5</td><td>≤ t</td></tr>
</table></td></tr>
<tr><td></td><td>d. The crack that has potential to enlarge
 
None
* No crack allow ed to reach seal area.
Y ≤ 1, in case of two cracks found.</td></tr>
<tr><td>Indication (Cosmetic)</td><td>Indication is legible.</td></tr>
</table>

COMPONENTS

Appearance of FPC (Cosmetic)	Discoloration(resist, plate, etc): refer to the limit sample Stain: refer to the limit sample Dent: refer to the limit sample Fold and wrinkle: refer to the limit sample Bubble of reinforcement plate: refer to the limit sample Curl: acceptable.
Parts alignment (Cosmetic)	(1) Flat packaged LSI, IC Locate 2/3 or more of the widths of the lead on the pattern pad.  (2) Chip component Locate 2/3 or more of the widths of the electrode on the pattern pad. Locate the entire electrode on the pattern pad. If the widths of pattern pad are narrower than component electrode. 
The height of components (Cosmetic)	The installation floatages of the chip components must be less than 0.5mm from the FPC pad. Individual regulations give priority when individual regulations exist on specified drawings 

FPC electrode peeling off (floating)(cosmetic)	The electrode (FPC pattern) must not peel off from the FPC substrate. 
Damaged FPC pattern (Cosmetic)	The width of pinhole and/or loss of FPC pattern must be less than 1/3 of pattern width.  Less than A/3 Less than 1/3 of pattern width
Damaged plating of FPC (Cosmetic)	The width of pinhole and/or loss of FPC pattern must be less than 1/2 of pattern width.  Less than A/3 Less than 1/3 of pattern width
FPC resist separation (Cosmetic)	FPC pattern which not soldered must be coated by resist. 
Damage of Driver IC chip (Cosmetic)	 a < 0.2mm, b < 0.3mm, c < 0.2mm, d<0.5h

Damaged electrode of chip components (Cosmetic)	Do not expose the inside. Do not allow the crack. Peeling off of the electrode plating must be less than 10% of the area of the electrode. 
Conductive foreign material (Cosmetic)	Conductive foreign material of length, which exceeds 0.3mm must not adhere on the module. Even if the length of foreign material is less than 0.3mm, adhering on leads of IC and LSI is not acceptable. 
Alignment condition (Cosmetic)	The FPC terminal should be located within the width of ITO terminal
Masking tape (Cosmetic) (For the model with masking tape)	* Do not forget to put masking tape. * Cover the chip of LCD driver. * Bubble, wrinkle and floatage, which do not exceed allowance of outline dimension, are acceptable.
Resin coating (for FPC terminaqls) (Cosmetic)	*The coating area must not exceed the area specified by outline dimensions. *The resin must cover the plating portion of FPC output terminals.
Resin coating (for ITO terminals) (Cosmetic)	* The coating area must not exceed the area specified by outline dimensions. * The resin must cover the slit portion of ITO terminals.

Precaution for use of LCD module

11.1、Handling Precautions

1) The display panel is made of glass. Do not subject it to a mechanical shock by dropping it from a high place, etc.
2) If the display panel is damaged and the liquid crystal substance inside it leaks out ,be sure not to get any in your mouth, if the substance comes into contact with your skin or clothes, promptly wash it off using soap and water.
3) Do not apply excessive force to the display surface or the adjoining areas since this may cause the color tone to vary.
4) The polarizer covering the display surface of the LCD module is soft and easily scratched. Handle this polarizer carefully.
5) If the display surface is contaminated, breathe on the surface and gently wipe it with a soft dry cloth. If still not completely clear, moisten cloth with one of the following solvents:
--Isopropyl alcohol
--Ethyl alcohol
Solvents other than those mentioned above may damage the polarizer.
Especially, do not use the following:
--Water
--Ketone
--Aromatic solvents
6) Do not attempt to disassemble or process the LCD module.

11.2、Assembling Precautions

1) When mounting the LCD module make sure that it is free of twisting, warping, and distortion. Distortion has great influence upon display quality. Also keep the stiffness enough regarding the outer case.
2) Please handle the LCD module by its side.
3) NC terminal should be open. Do not connect anything.
4) If the logic circuit power is OFF, do not apply the input signals.
5) To prevent destruction of the elements by static electricity, be careful to maintain an optimum work environment.
·Be sure to ground the body when handling the LCD module.
·Tools required for assembly, such as soldering irons, must be properly grounded.
·To reduce the amount of static electricity generated, do not conduct assembly and other work

under dry conditions.

·The LCD module is coated with a film to protect the display surface.

Exercise care when peeling off this protective film since static electricity may be generated.

6) Be careful when treating the glass panel because it has very sharpened edge.

11.3、Storage Precautions

1) When storing the LCD module, avoid exposure to direct sunlight of to the light of fluorescent lamps and high temperature/high humidity. Whenever possible, the LCD module should be stored in the same conditions in which they were shipped from our company.
2) Exercise care to minimize corrosion of the electrode. Corrosion of the electrodes is accelerated by water droplets or a current flow in a high-humidity environment.

11.4、Design Precautions

The absolute maximum ratings represent the rated value beyond which LCD module can not exceed.

1) When the LCD modules are used in excess of this rated value, their operation characteristics may be adversely affected.
2) To prevent the occurrence of erroneous operation caused by noise, attention must be paid to satisfy V_{IL}, V_{IH} specification values including taking the precaution of using signal cables that are short.
3) The LCD exhibits temperature dependency characteristics. Since recognition of the display becomes difficult when the LCD is used outside its designated operating temperature range, be sure to use the LCD within this range. Also keep in mind that the LCD driving voltage levels necessary for clear displays will vary according to temperature.
4) We recommended that power supply lines (VDD) have over-current protection line. (Fuse etc. Recommend Value:0.5A)
5) Sufficiently notice the mutual noise interference occurred by peripheral devices.
6) To cope with EMI, take measures basically on outputting side.
7) When installing an LCD module, fasten it at the LCD panel.
8) The display panel is made of general float glass which is not guaranteed for strength. So please consider about following.

·Do not subject panel to a mechanical shock by dropping directly.

·Do not let case to touch to panel directly.

11.5、Others

1) Liquid crystal solidifies under low temperature (below the storage temperature range) leading to defective orientation or the generation of air bubbles (black or white). Air bubbles may also be generated if the LCD module is subjected to a strong shock at a low temperature.
2) If the LCD modules have been operating for a long time showing the same display patterns, the display patterns may remain on the screen as ghost images and a slight contrast irregularity may also appear. A normal operating status can be regained by suspending use for some time. It should be noted that this phenomenon does not adversely affect performance reliability.
3) To minimize the performance degradation of the LCD module's resulting from destruction caused by static electricity, etc., exercise care to avoid touching the following section when handling this module: LCD's Terminal electrode sections.
4) Optimum voltage to obtain best contrast value depending on products. Therefore voltage adjustment with electric volume is required in each display.
5) Precaution for disposal of LCD module. When disposal of LCD module, ask specialization company of industrial waste which is permitted by the government. When burn up LCD module, obey the law of environmental hygienic wash it off well with soap and water.

PACKING METHOD

包装仕样书

TBD：