XIAMEN OCULAR

Specifications for Approval

Customer : _____

Model name : __GDC24064B-FSW-FBW__   **REV: A**

Description : __COG 240X64 GRAPHIC_____

LCD type : __FSTN/TRANSFLECTIVE/POSITIVE__

ISSUE	ENG	QA	APPROVAL
PD	SKY	LLW	JENSON

Customer Approval	☐ **Accept** ☐ **Reject** **Comment:** **Approved by:** _____

REVISION RECORD (MODEL NO.: GDC24064B-FSW-FBW)

Revision	Revision Date	Page	Contents
A	2012/08/16		Initial Release and Issue Full Specification

CONTENTS

1. FEATURES

The features of LCD are as follows

* Display mode   : FSTN, Positive, Transflective

* Color   : Display dot: Black

                          Background: White

* Display Format   : 240Dots × 64Dots graphic

* IC   : SITRONIX ST7565P-G * 2

* Interface Input Data : 8-Bit Parallel and Serial interface MPUs

* Driving Method   : 1/65 Duty, 1/9 Bias

* Viewing Direction   : 6 O'clock

* Backlight   : WHITE LED

2. MECHANICAL SPECIFICATIONS

Item	Specification	Unit
Module Size	144.9(W) X 56.4(H) X 6.5MAX(T)	mm
Viewing Area	132.6MIN(W) X 39MIN(H)	mm
Effective Display Area	127.17(W) X 33.89(H)	mm
Number of Dots	240 X 64Dots	-
Dot Size	0.50(W) X 0.50(H)	mm
Dot Pitch	0.53(W) X 0.53(H)	mm

3. ELECTRICAL SPECIFICATIONS

3-1. Absolute Maximum Ratings (Vss=0V)

Item	Symbol	Standard Value			Unit
		Min.	Typ.	Max.	
Supply Voltage For Logic	V_{DD}	0.3	_	5.0	V
Supply Voltage For LCD Drive	V_0	0.3	_	15	V
Operating Temp.	T_{OP}	-20	-	+70	°C
Storage Temp.	T_{ST}	-30	-	+80	°C
Static Electricity	Be sue that you are ground when handing LCM				

3. ELECTRICAL SPECIFICATIONS (Continued)

3-2-1.Electrical Characteristics

Item		Symbol	Test Condition	Min.	Typ.	Max.	Unit
Supply Voltage For Logic		$V_{DD} - V_{SS}$	Ta=25℃	2.7	3.0	3.3	V
Supply Voltage For LCD		$V_0 - V_{SS}$	Ta=25℃	10.0	10.5	11	V
Input Voltage	"H" Level	V_{IH}	Ta=25℃	$0.8V_{DD}$	-	V_{DD}	V
	"L" Level	V_{IL}		V_{SS}	-	$0.2V_{DD}$	V
Output Voltage	"H" Level	V_{OH}	I_{OUT}= -0.5mA	$0.8V_{DD}$	-	V_{DD}	V
	"L" Level	V_{OL}	I_{OL} = 0.5mA	V_{SS}	-	$0.2V_{DD}$	V
Current Consumption		I_{DD}	-	-	0.44	2	mA

NOTE: 1) Duty ratio=1/65, Bias=1/9

2) Measured in Dots ON-state

3-3. BACKLIGHT

3-3-1. Absolute Maximum Ratings

Item	Symbol	Condition	Min.	Typ.	Max	Unit
Forward Current	IF	Ta= 25℃	-	120	220	mA
Reverse Voltage	VR		-	-	8	V
Power Dissipation	PD	Ta= 25℃	-	-	840	mW

3-3-2. Opto-electronic Characteristics

Item	Symbol	Condition	Min.	Typ.	Max	Unit
Forward Voltage	VF	Ta= 25℃ IF= 120mA	-	3.1	3.3	V
Luminous	-		100	-	-	cd/m²

4. POWER SUPPLY & BLOCK DIAGRMA

4-1 Power supply

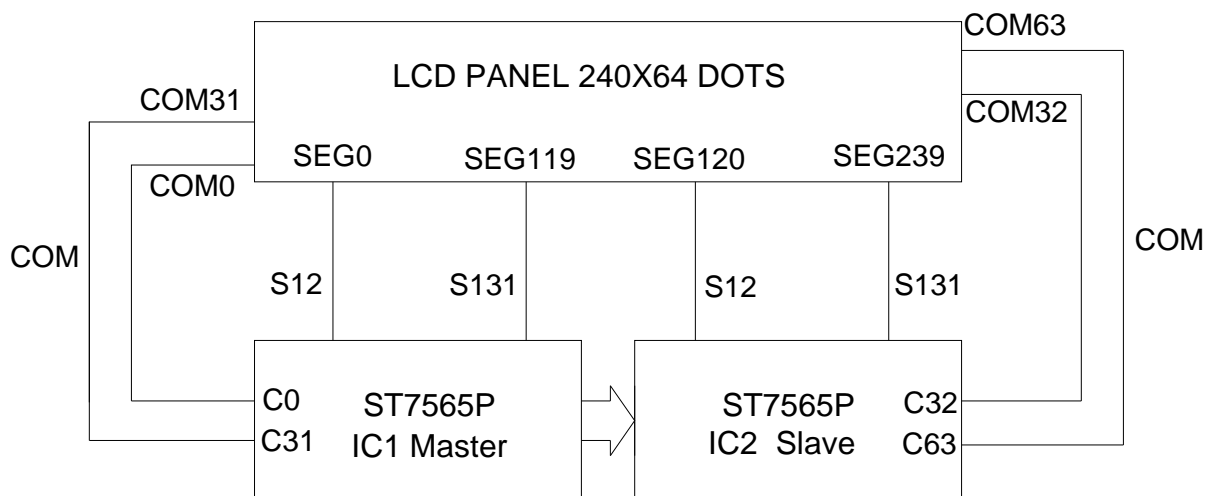(1) When the voltage regulator internal resistor
    is used.
(Example where $V_{DD2} = V_{DD}$, with 4x step-up)
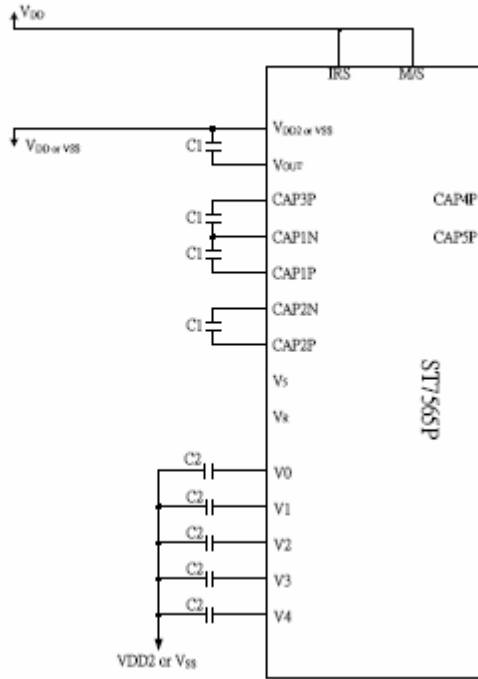
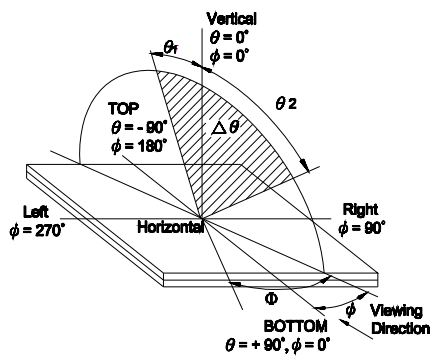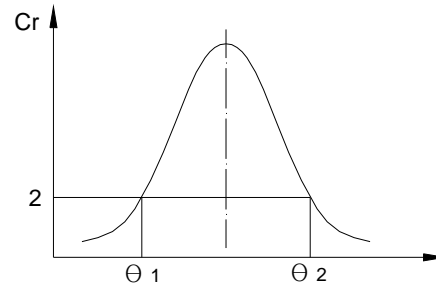Note: 1. C1: 1.0 to 4.7 μF

2. C2: 0.1 to 4.7 μF

4-2 BLOCK DIAGRAM

5. ELECTRO – OPTICAL CHARACTERISTICS

Item	Symbol	Temp.	Min.	Typ.	Max.	Unit	Conditions	Note
Viewing Angle	$|\theta 2 - \theta 1|$	25℃	30	65	-	Deg.	-	1,2
	Φ		60	75	-			
Contrast Ratio	Cr	25℃	2	5.2	6.2	-	$\theta = 0°$ $\Phi = 0°$	3
Response Time(rise)	Tr	25℃	-	96	150	ms	$\theta = 0°$ $\Phi = 0°$	4
		0℃	-	950	1150			
Response Time(fall)	Tf	25℃	-	167	250	ms	$\theta = 0°$ $\Phi = 0°$	4
		0℃	-	950	1150			

Note 1 . Definition of Angle θ & Φ	Note 2. Definition of Viewing Angle $\theta 1$ & $\theta 2$

Note 1 . Definition of Angle θ & Φ

Vertical
$\theta = 0°$
$\phi = 0°$

θ_1

TOP
$\theta = -90°$
$\phi = 180°$

$\theta 2$

$\triangle\theta$

Left
$\phi = 270°$

Horizontal

Right
$\phi = 90°$

Φ

ϕ Viewing Direction

BOTTOM
$\theta = +90°, \phi = 0°$

Note 2. Definition of Viewing Angle $\theta 1$ & $\theta 2$

Cr

2

$\theta 1$ $\theta 2$

Note 3 . Definition of Contrast Cr

Intensity

100%

B

Selected Dots

Non-selected Dots

0%

A

Driving Voltage

Cr=B/A
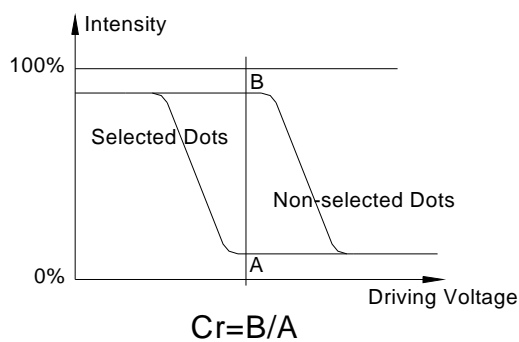
Note 4. Definition of Optical Response

Vo age Wave Form

Luminance

OFF   ON   OFF

90%

10%

Tr   Tf   T
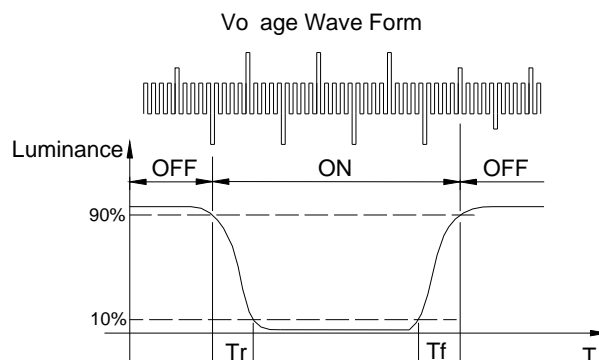
6. Interface Pin Function

Pin NO.	Symbol	I / O	Functions
29	/CS1(M)	I	This is the chip select signal.
28	/CS1(S)		
27	/RES	I	When RES is set to "L", the setting are initialized.
26	A0	I	This is connect to the least significant bit of the Norman MPU address bus, and it determines whether the data bits are data or a command.
25	/WR	I	When connected to an 8080 MPU, this is active LOW
24	/RD	I	When connected to an 8080 MPU, this is active LOW
23~16	DB0~DB7	I/O	This is an 8-bit bi-directional data bus that connects to an 8-bit or 16-bit standard MPU data bus.
15	V_{DD}	Power supply	Shared with the MPU power supply terminal V_{CC}
14	V_{SS}	Power supply	This is a 0v terminal connected to the system GND.
13	V_{OUT}	O	DC/DC voltage converter. Connect a capacitor between this terminal and v_{ss}
12	C3+	O	DC/DC voltage converter. Connect a capacitor between this terminal and the CAP1N terminal.
11	C1-	O	DC/DC voltage converter. Connect a capacitor between this terminal and the CAP1P terminal.
10	C1+	O	DC/DC voltage converter. Connect a capacitor between this terminal and the CAP1N terminal.
9	C2+	O	DC/DC voltage converter. Connect a capacitor between this terminal and the CAP1P terminal.
8	C2-	O	DC/DC voltage converter. Connect a capacitor between this terminal and the CAP1N terminal.
7~3	V4~V0	Power supply	This is a multi-level power supply for the liquid crystal drive.
2	C86	I	This is the MPU interface switch terminal.
1	P/S	I	This is the parallel data input/serial data input switch terminal.

7. COMMAND LIST

Command	A0	/RD	/WR	D7	D6	D5	D4	D3	D2	D1	D0	Function
(1) Display ON/OFF	0	1	0	1	0	1	0	1	1	1	0 / 1	LCD display ON/OFF 0: OFF, 1: ON
(2) Display start line set	0	1	0	0	1	Display start address						Sets the display RAM display start line address
(3) Page address set	0	1	0	1	0	1	1	Page address				Sets the display RAM page address
(4) Column address set upper bit	0	1	0	0	0	0	1	Most significant column address				Sets the most significant 4 bits of the display RAM column address.
Column address set lower bit	0	1	0	0	0	0	0	Least significant column address				Sets the least significant 4 bits of the display RAM column address.
(5) Status read	0	0	1	Status				0	0	0	0	Reads the status data
(6) Display data write	1	1	0	Write data								Writes to the display RAM
(7) Display data read	1	0	1	Read data								Reads from the display RAM
(8) ADC select	0	1	0	1	0	1	0	0	0	0	0 / 1	Sets the display RAM address SEG output correspondence 0: normal, 1: reverse
(9) Display normal/ reverse	0	1	0	1	0	1	0	0	1	1	0 / 1	Sets the LCD display normal/ reverse 0: normal, 1: reverse
(10) Display all points ON/OFF	0	1	0	1	0	1	0	0	1	0	0 / 1	Display all points 0: normal display 1: all points ON
(11) LCD bias set	0	1	0	1	0	1	0	0	0	1	0 / 1	Sets the LCD drive voltage bias ratio 0: 1/9 bias, 1: 1/7 bias (ST7565P)
(12) Read/modify/write	0	1	0	1	1	1	0	0	0	0	0	Column address increment At write: +1 At read: 0
(13) End	0	1	0	1	1	1	0	1	1	1	0	Clear read/modify/write
(14) Reset	0	1	0	1	1	1	0	0	0	1	0	Internal reset
(15) Common output mode select	0	1	0	1	1	0	0	0 / 1	*	*	*	Select COM output scan direction 0: normal direction 1: reverse direction
(16) Power control set	0	1	0	0	0	1	0	1	Operating mode			Select internal power supply operating mode
(17) Vo voltage regulator internal resistor ratio set	0	1	0	0	0	1	0	0	Resistor ratio			Select internal resistor ratio(Rb/Ra) mode
(18) Electronic volume mode set	0	1	0	1	0	0	0	0	0	0	1	Set the Vo output voltage electronic volume register
Electronic volume register set				0	0	Electronic volume value						
(19) Static indicator ON/OFF	0	1	0	1	0	1	0	1	1	0	0 / 1	0: OFF, 1: ON
Static indicator register set				0	0	0	0	0	0	0	Mode	Set the flashing mode
(20) Booster ratio set	0	1	0	1	1	1	1	1	0	0	0	select booster ratio 00: 2x,3x,4x 01: 5x 11: 6x
				0	0	0	0	0	0	step-up value		
(21) Power saver												Display OFF and display all points ON compound command
(22) NOP	0	1	0	1	1	1	0	0	0	1	1	Command for non-operation
(23) Test	0	1	0	1	1	1	1	*	*	*	*	Command for IC test. Do not use this command

8. TIMING CHARACTERISTICS

8-1. 8080 Series MPU
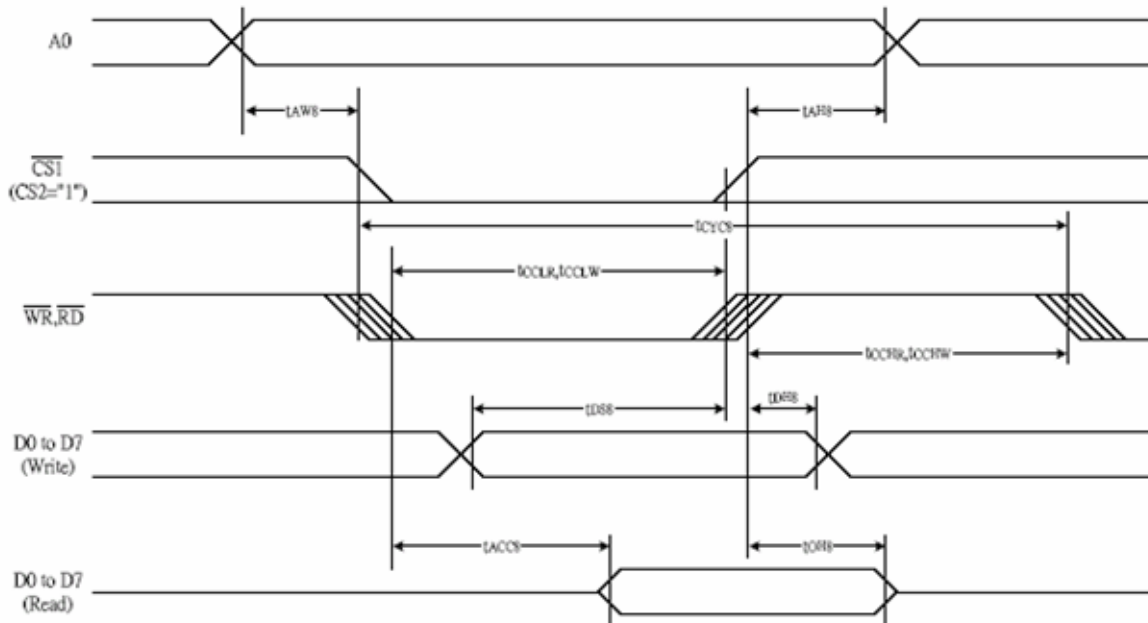
Figure 37

Table 24

(V$_{DD}$ = 3.3V , Ta =25°C)

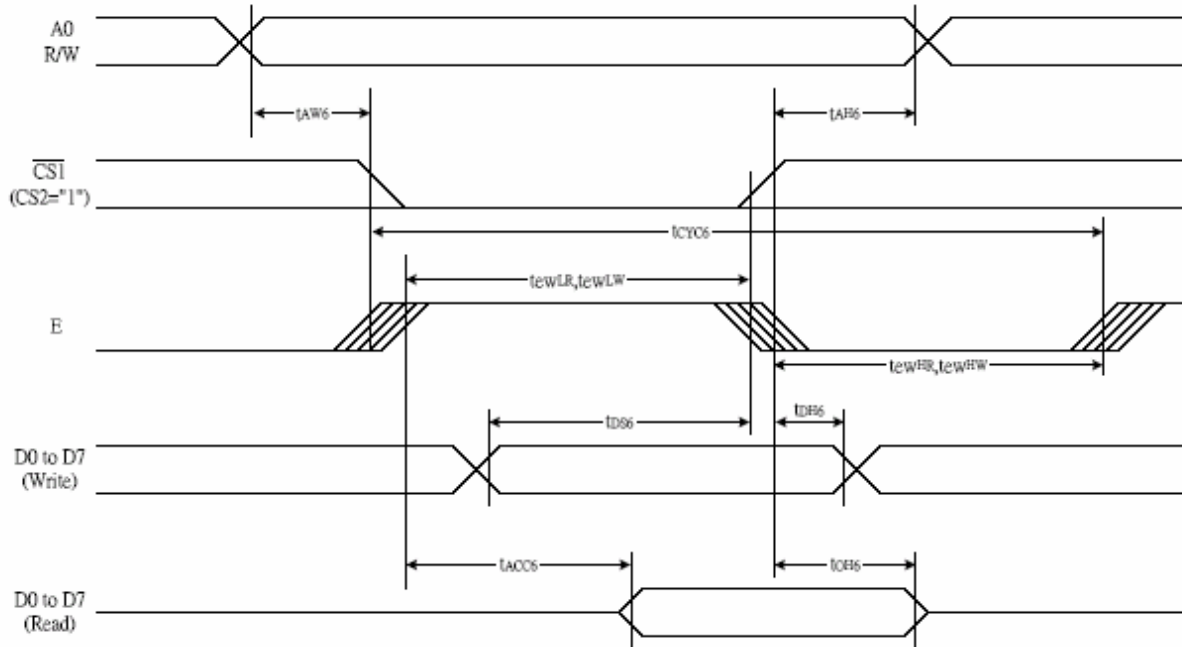| Item	Signal	Symbol	Condition	Rating Min.	Rating Max.	Units
Address hold time	A0	t$_{AH8}$		0	—	Ns
Address setup time		t$_{AW8}$		0	—	
System cycle time		t$_{CYC8}$		240	—	
Enable L pulse width (WRITE)	WR	t$_{CCLW}$		80	—	
Enable H pulse width (WRITE)		t$_{CCHW}$		80	—	
Enable L pulse width (READ)	RD	t$_{CCLR}$		140	—	
Enable H pulse width (READ)		t$_{CCHR}$		80		
WRITE Data setup time	D0 to D7	t$_{DS8}$		40	—	
WRITE Address hold time		t$_{DH8}$		0	—	
READ access time		t$_{ACC8}$	C$_L$ = 100 pF	—	70	
READ Output disable time		t$_{OH8}$	C$_L$ = 100 pF	5	50	

*1 The input signal rise time and fall time (t$_r$, t$_r$) is specified at 15 ns or less. When the system cycle time is extremely fast, (t$_r$ +t$_r$) ≦ (t$_{CYC8}$ – t$_{CCLW}$ – t$_{CCHW}$) for (t$_r$ + t$_r$) ≦ (t$_{CYC8}$ – t$_{CCLR}$ – t$_{CCHR}$) are specified.
*2 All timing is specified using 20% and 80% of V$_{DD}$ as the reference.
*3 t$_{CCLW}$ and t$_{CCLR}$ are specified as the overlap between /CS1 being "L" (CS2 = "H") and /WR and /RD being at the "L" level.

8. TIMING CHARACTERISTICS (Continued)

8-2.6800 Series MPU

(VDD = 3.3 V , Ta = 25°C)

Item	Signal	Symbol	Condition	Rating Min.	Rating Max.	Units
Address hold time		t_{AH6}		0	—	
Address setup time	A0	t_{AW6}		0	—	
System cycle time		t_{CYC6}		240	—	
Enable L pulse width (WRITE)	WR	t_{EWLW}		80	—	
Enable H pulse width (WRITE)		t_{EWHW}		80	—	
Enable L pulse width (READ)	RD	t_{EWLR}		80	—	ns
Enable H pulse width (READ)		t_{EWHR}		140		
WRITE Data setup time		t_{DS6}		40	—	
WRITE Address hold time	D0 to D7	t_{DH6}		0	—	
READ access time		t_{ACC6}	C_L = 100 pF	—	70	
READ Output disable time		t_{OH6}	C_L = 100 pF	5	50	

*1 The input signal rise time and fall time (t_r, t_f) is specified at 15 ns or less. When the system cycle time is extremely fast, (t_r + t_f) $\leq$ (t_{CYC6} – t_{EWLW} – t_{EWHW}) for (t_r + t_f) $\leq$ (t_{CYC6} – t_{EWLR} – t_{EWHR}) are specified.
*2 All timing is specified using 20% and 80% of VDD as the reference.
*3 t_{EWLW} and t_{EWLR} are specified as the overlap between $\overline{CS1}$ being "L" (CS2 = "H") and E.

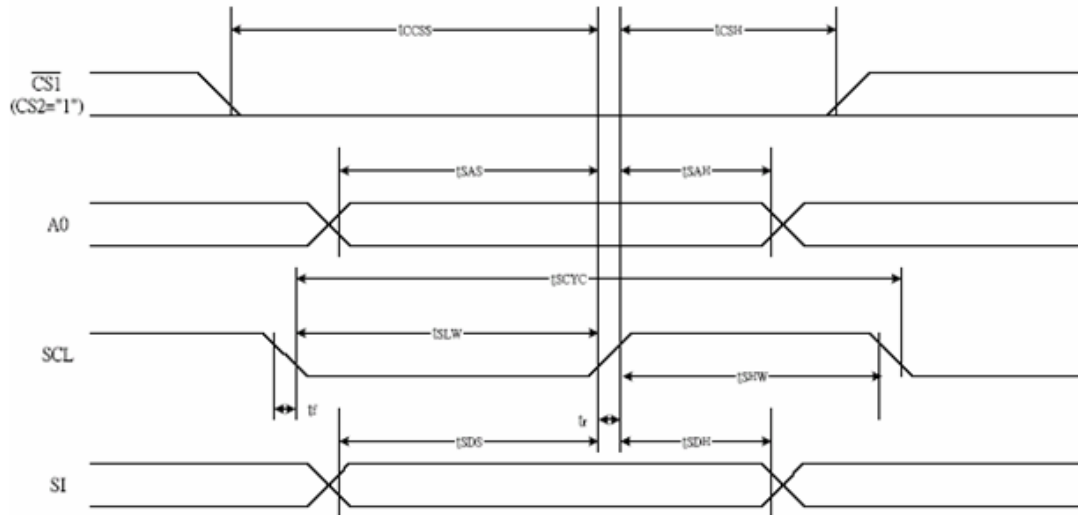## 8. TIMING CHARACTERISTICS (Continued)

8-3.The Serial Interface

Figure 39

Table 30

(VDD = 3.3V, Ta =25°C)

Item	Signal	Symbol	Condition	Rating Min.	Rating Max.	Units
Serial Clock Period	SCL	T_{scyc}		50	—	ns
SCL "H" pulse width		T_{shw}		25	—	
SCL "L" pulse width		T_{SLW}		25	—	
Address setup time	A0	T_{SAS}		20	—	
Address hold time		T_{sah}		10	—	
Data setup time	SI	T_{sds}		20	—	
Data hold time		T_{SDH}		10	—	
CS-SCL time	CS	T_{css}		20	—	
CS-SCL time		T_{csh}		40	—	

*1 The input signal rise and fall time (tr, tf) are specified at 15 ns or less.
*2 All timing is specified using 20% and 80% of VDD as the standard.

8-4. Reset Timing
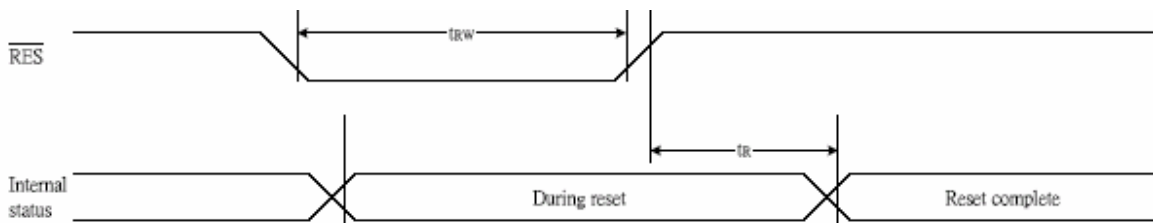
(VDD = 3.3V , Ta = −40 to 85°C)
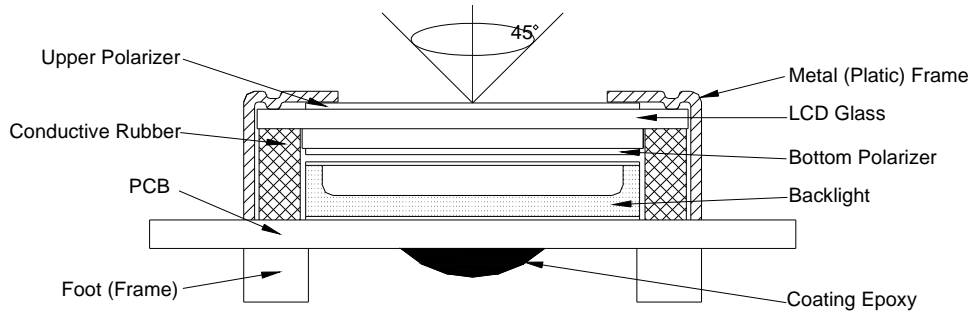
Item	Signal	Symbol	Condition	Rating Min.	Rating Typ.	Rating Max.	Units
Reset time		t_R		—	—	1.0	us
Reset "L" pulse width	/RES	t_{RW}		1.0	—	—	us

9. QUALITY SPECIFICATION

9 - 1. LCM Appearance and Electric inspection Condition
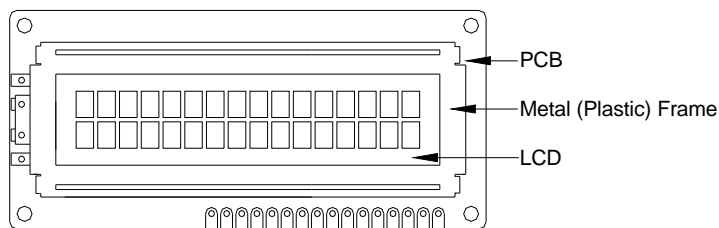
    1. Inspection will be done by placing LCM 30cm away from inspector's eyeballs under normal illumination.
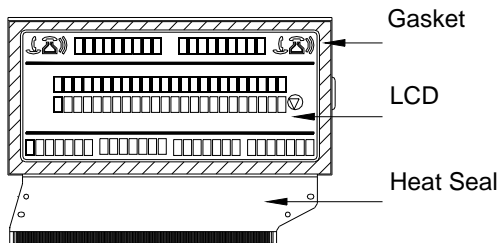
```
                                    45°

Upper Polarizer                              Metal (Platic) Frame
                                             LCD Glass
Conductive Rubber                            Bottom Polarizer
PCB                                          Backlight

Foot (Frame)                                 Coating Epoxy
```

    2. View Angle: with in 45°around perpendicular line.

9 - 2. Definition

    1. COB

```
                                    PCB
                                    Metal (Plastic) Frame
                                    LCD
```

    2. Heat Seal

```
                                    Gasket

                                    LCD

                                    Heat Seal
```

    3. TAB and COG

```
        LCD Glass              LCD Glass

                              IC
        ITO Terminal
        Pad                   Pin

        IC

    TAB              COG
```
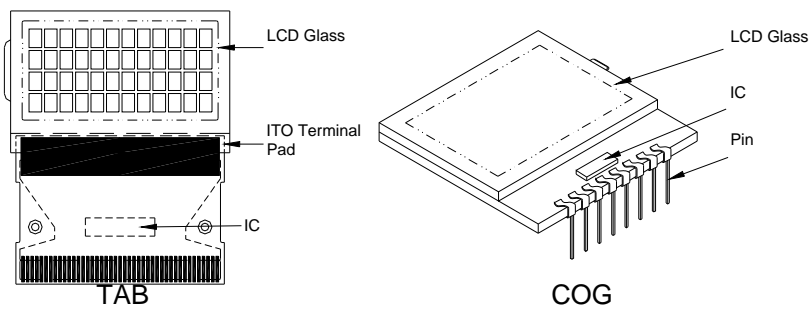
9. QUALITY SPECIFICATION (Continued)

9-3. Sampling Plan and Acceptance

1. Sampling Plan

MIL - STD - 105E (‖) ordinary single inspection is used.
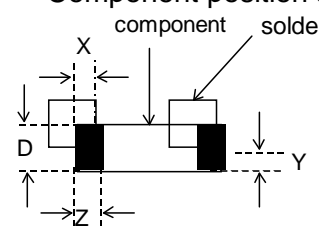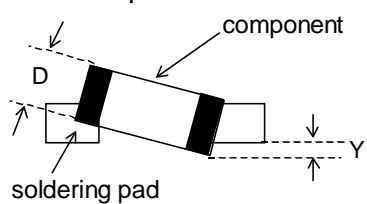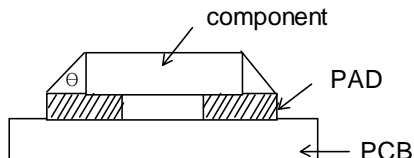
2. Acceptance

Major defect:　　　　　　AQL = 0.25%

Minor defect:　　　　　　AQL = 0.65%

9-4. Criteria

1. COB

Defect	Inspection Item	Inspection Standards	
Major	PCB copper flakes peeling off	Any copper flake in viewing Area should be greater than $1.0mm^2$	Reject
Major	Height of coating epoxy	Exceed the dimension of drawing	Reject
Major	Void or hole of coating epoxy	Expose bonding wire or IC	Reject
Major	PCB cutting defect	Exceed the dimension of drawing	Reject

2. SMT

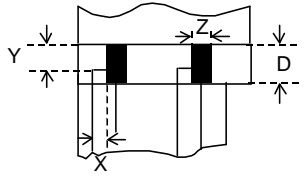| Defect	Inspection Item	Inspection Standards	
Minor	Component marking not readable		Reject
Minor	Component height	Exceed the dimension Of drawing	Reject
Major	Component solder defect (missing , extra, wrong component or wrong orientation		Reject
Minor	Component position shift	$X < 3/4Z$ $Y > 1/3D$	Reject Reject
Minor	Component tilt	$Y > 1/3D$	Reject
Minor	Insufficient solder	$\theta \le 20°$	Reject

9. QUALITY SECIFICATION (Continued)

9-4. Criteria (Continued)

3. Metal (Plastic) Frame

Defect	Inspection Item	Inspection Standards		
Major	Crack / breakage	Anywhere		Reject
Minor	Frame Scratch	W	L	Acceptable of Scratch
		w<0.1mm	Any	Ignore
		0.1≤w<0.2mm	L≤5.0mm	2
		0.2≤w<0.3mm	L≤3.0mm	1
		w≥0.3mm	Any	0
		Note : 1. Above criteria applicable to scratch lines with distance greater than 5mm. 2. Scratch on the back side of frame (not visible) can be ignored .		
Minor	Frame Dent , Prick $\Phi = \dfrac{L + W}{2}$			Acceptable of Dents / Pricks
		$\Phi \leq 1.0mm$		2
		$1.0 < \Phi \leq 1.5mm$		1
		$1.5mm < \Phi$		0
		Note : 1. Above criteria applicable to any two dents / pricks with distance greater than 5mm 2. Dent / prick on the back side of frame (not visible) can be ignored		
Minor	Frame Deformation	Exceed the dimension of drawing		
Minor	Metal Frame Oxidation	Any rust		

4. Flexible Film Connector (FFC)

Defect	Inspection Item	Inspection Standards	
Minor	Tilted soldering	Within the angle +5°	Acceptable
Minor	Uneven solder joint /bump		Reject
Minor	Hole $\Phi = \dfrac{L + W}{2}$	Expose the conductive line	Reject
		$\Phi > 1.0mm$	Reject
Minor	Position shift	Y > 1/3D	Reject
		X > 1/2Z	Reject
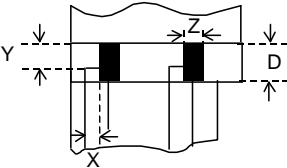
9. QUALITY SPECIFICATION (Continued)

9-4. Criteria (Continued)

5. Screw

Defect	Inspection Item	Inspection Standards	
Major	Screw missing/loosen		Reject
Minor	Screw oxidation	Any rust	Reject
Minor	Screw deformation	Difficult to accept screw　driver	Reject

6. Heatseal 、TCP 、FPC

Defect	Inspection Item		Inspection Standards	
Major	Scratch expose conductive layer			Reject
Minor	HS Hole	$\Phi = \dfrac{L + W}{2}$	$\Phi > 0.5mm$	Reject
Major	Adhesion strength		Less than the specification	Reject
Minor	Position shift		$Y > 1/3D$	Reject
			$X > 1/2Z$	Reject
Major	Conductive line break			Reject

7. LED Backing Protective Film and Others

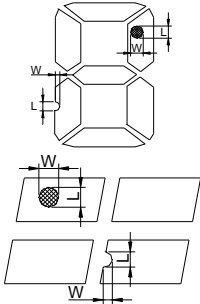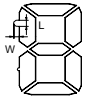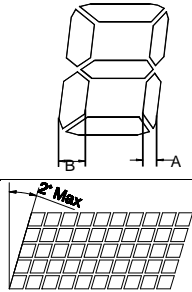| Defect	Inspection Item	Inspection Standards	
Minor	LED dirty, prick	Acceptable number of units	
		$\Phi \leq 0.10mm$	Ignore
		$0.10 < \Phi \leq 0.15mm$	2
		$0.15 < \Phi \leq 0.2mm$	1
		$\Phi > 0.2mm$	0
		The distance between any two spots should be $\geq 5mm$ Any spot/dot/void outside of viewing area is acceptable	
Minor	Protective film tilt	Not fully cover LCD	Reject
Major	COG coating	Not fully cover　ITO circuit	Reject

8. Electric Inspection

Defect	Inspection Item	Inspection Standards	
Major	Short		Reject
Major	Open		Reject

9. QUALITY SPECIFICATION (Continued)

9-4. Criteria (Continued)

9. Inspection Specification of LCD

Defect	Inspect Item		Inspection Standards			
Minor	Linear Defect	∗ Glass Scratch ∗ Polarizer Scratch ∗ Fiber and Linear material	**W**	W≤0.03	0.03<W≤0.05	W>0.05
			L	L<5	L<3	Any
			ACC. NO.	1	1	Reject
			Note	L is the length and W is the width of the defect		
Minor	Black Spot and Polarizer Pricked	∗ Foreign material between glass and polarizer or glass and glass ∗ Polarizer hole or protuberance by external force	**Φ**	Φ≤0.1	0.1<Φ≤0.15	0.15<Φ≤0.2	Φ>0.2
			ACC. NO.	3EA / 100mm²	2	1	0
			Note	Φ is the average diameter of the defect. Distance between two defects > 10mm.			
Minor	White Spot and Bubble in polarizer	∗ Unobvious transparant foreign material between glass and glass or glass and polarizer ∗ Air protuberance between polarizer and glass	**Φ**	Φ≤0.3	0.3<Φ≤0.5	0.5<Φ
			ACC. NO.	3EA / 100mm²	1	0
			Note	Φ is the average diameter of the defect. Distance between two defects > 10mm.		

Defect	Inspect Item	Figure	Inspection Standards			
Minor	Segment Defect		**Φ**	Φ≤0.10	0.10<Φ≤0.20	0.20<Φ≤0.25	Φ>0.25
			ACC. NO.	3EA / 100mm²	2	1	0
			Note	W is more than 1/2 segment width → Reject $\Phi = \dfrac{L + W}{2}$ Distance between two defect is 10mm			
Minor	Protuberant Segment	$\Phi = (L + W) / 2$	**Φ**	Φ≤0.10	0.10<Φ≤0.20	0.20<Φ≤0.25	Φ>0.25
			W	Glue	W≤1/2 Seg W≤0.2	W≤1/2 Seg W≤0.2	Ignore
			ACC. NO.	3EA / 100mm²	2	1	0

Defect	Inspect Item	Figure	Inspection Standards			
Minor	Assembly Mis-alignment		1. Segment			
			B	B≤0.4mm	0.4<B≤1.0mm	B>1.0mm
			B-A	B-A<1/2B	B-A<0.2	B-A<0.25
			Judge	Acceptable	Acceptable	Acceptable
			2. Dot Matrix			
			Deformation>2°			Reject
Minor	Stain on LCD Panel Surface		Accept when stains can be wiped lightly with a soft cloth or a similar one. Otherwise, judged according to the above items: "Black spot" and "White Spot"			

10. RELIABILITY

NO.	Item	Condition	Criterion
1	High Temperature Operating	10℃, 96Hrs	No defect in cosmetic and operational function allowable. Total current Consumption should be below double of initial value.
2	Low Temperature Operating	60℃, 96Hrs	
3	High Humidity	40℃, 90%RH, 96Hrs	
4	High Temperature Storage	70℃, 96Hrs	
5	Low Temperature Storage	-20℃, 96Hrs	
6	Vibration	Random wave 10 ~ 100Hz Acceleration: 2g 2 Hrs per direction(X,Y,Z)	
7	Thermal Shock	10℃ to 25℃ to 60℃ (60Min) (5Min) (60Min) 10Cycles	
8	ESD Testing	Contract Discharge Voltage: +1 ~ 5kV and −1 ~ −5kV	There will be discharged ten times at every discharging voltage cycle. The voltage gap is 1kV.
		Air Discharge Voltage: +1 ~ 8kV and −1 ~ -8kV	

Note:　　1) Above conditions are suitable for XMOCULAR standard products.

2) For restrict products, the test conditions listed as above must be revised.

11. HANDLING PRECAUTION

(1) Mounting Method

The panel of the LCD Module consists of two thin glass plates with polarizers
which easily get damaged since the Module is fixed by utilizing fitting holes
in the printed circuit board. Extreme care should be taken when handling
the LCD Modules.

(2) Caution of LCD handling & cleaning

When cleaning the display surface, use soft cloth with solvent (recommended
below) and wipe lightly.

- Isopropyl alcohol

- Ethyl alcohol

- Trichlorotrifloroethane

Do not wipe the display surface with dry or hard materials that will damage the
polarizer surface.

Do not use the following solvent:

- Water

- Ketone

- Aromatics

(3) Caution against static charge

The LCD Module use C-MOS LSI drivers, so we recommend that you connect
any unused input terminal to VDD or VSS, do not input any signals before power
is turned on. And ground your body, Work/assembly table. And assembly
equipment to protect against static electricity.

(4) Packaging

-   Modules use LCD elements, and must be treated as such. Avoid intense shock
and falls from a height.

- To prevent modules from degradation. Do not operate or store them exposed
directly to sunshine or high temperature/humidity.

(5) Caution for operation

- It is indispensable to drive LCD's within the specified voltage limit since the higher
voltage than the limit shorten LCD life. An electrochemical reaction due to direct
current causes LCD deterioration, Avoid the use of direct current drive.

11. HANDLING PRECAUTION (Continued)

- Response time will be extremely delayed at lower temperature than the operating temperature range and on the other hand at higher temperature LCD's show dark color in them.

However those phenomena do not mean malfunction or out of order with LCD's. Which will come back in the specified operating temperature range.

- If the display area is pushed hard during operation, some font will be abnormally displayed but it resumes normal condition after turning off once.
- A slight dew depositing on terminals is a cause for electro-chemical reaction resulting in terminal open circuit.

Usage under the relative condition of 40°C, 50%RH or less is required.

(6) Storage

In the case of storing for a long period of time (for instance, one years) for the purpose or replacement use, the following ways are recommended.

- Storage in a polyethylene bag with sealed so as prevent fresh air outside in it, and with no desiccant.
- Placing in a dark place where neither exposure to direct sunlight nor light is. Keeping the condition within the specified storage temperature range.
- Storing with no touch on polarizer surface by the anything else. (It is recommended to store them as they have been contained in the inner container at the time of delivery)

(7) Safety

- It is recommendable to crash damaged or unnecessary LCD into pieces and wash off liquid crystal by using solvents such as acetone and ethanol.

Which should be burned up later.

- When any liquid crystal leaked out of a damaged glass cell comes in contact with your hands, please wash it off well with soap and water.

12. OUTLINE DIMENTION

240*64 DOTS

BACK
FRONT
CONDUCT SIDE
STIFFENER

52.65
0.6
3.5
6.5
0.3±0.05

A DETAIL (SCALE 2:1)
UNIT:mm
5
3
29
0.5
15.0
0.3
P0.5*28=14.0
1

56.4±0.3(LED)
54±0.3(LCD)
44±0.3
39MIN(V.A.)
33.89(A.A.)
40±0.5
1.2
3.7
6.26
6.15
8.87

144.9±0.3(LED)
142.5±0.2(LCD)
132.6MIN(V.A.)
127.17(A.A.)

25±0.5
10±0.5
55.8
67.2±0.5

9.3±0.5
8
1.5
K
123±0.3
138.9±0.3
10.95
3
A

29
15
1
A

S0 S119 S120 S239
C63
C32
C31
C0
LCD LAYOUT

1 X 9=9 CHIPS (WHITE COLOR)
BACKLIGHT CIRCUIT
LED+
LED-

PIN DESCRIPTION

PIN	SYMBOL	PIN	SYMBOL
1	P/S	16	DB7
2	C86	17	DB6
3	V0	18	DB5
4	V1	19	DB4
5	V2	20	DB3
6	V3	21	DB2
7	V4	22	DB1
8	C2-	23	DB0
9	C2+	24	/RD
10	C1+	25	/WR
11	C1-	26	A0
12	C3+	27	/RES
13	VOUT	28	/CS1(M)
14	VSS	29	/CS1(S)
15	VDD		

0.53
0.50
0.50
0.53
DOT DETAIL
SCALE:20X

NOTES:
1.DISPLAY TYPE: FSTN/TRANSFLECTIVE/POSITIVE
2.VIEW DIRECTION: 6 O'CLOCK
3.DRIVER METHOD:1/65 DUTY 1/9 BIAS
4.LCD DRIVING VOLTAGE:10.5V±0.3V
5.LOGIC SUPPLY VOLTAGE:3.0V±0.3V
6.OPERATING TEMP:-20° C~+70° C
7.STORAGE TEMP:-30° C~+80° C
8.CONTROLLER/DRIVER IC: ST7565P*2
9.CONNECTOR TYPE:COG+FPC
10.BACKLIGHT: LED SIDELIGHT TYPE, WHITE COLOR
11.BACKLIGHT DRIVING: Vf=3.1V, If=160mA, LUM 100cd/m^2(MIN.).
12.TOLERANCE UNLESS OTHERWISE SPECIFIED:±0.2mm

XIAMEN OCULAR OPTICS CO.,LTD

Model Name: GDC2406-4B-FSW-FBW
Date: JUN.12,2012
Drawn: SKY
Checker:
Approved:
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REVISION RECORD

Ver.	Date	Modify Contents	Name	Confirm
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