Crystal Clear Technology

Product Specification

G1212x05 series

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1.0 Table of Contents

2.0 Record of revision

Rev	Date	Item	Page	Comment	Originator	Checked By
1.0	22/08/08			Initial Release	Syam	Azhar

3.0 General specification

Display format: Graphics 128 x 128 dots

Dot size: 0.33 (w) x 0.33 (h) mm

Dot pitch: 0.35 (w) x 0.35 (h) mm

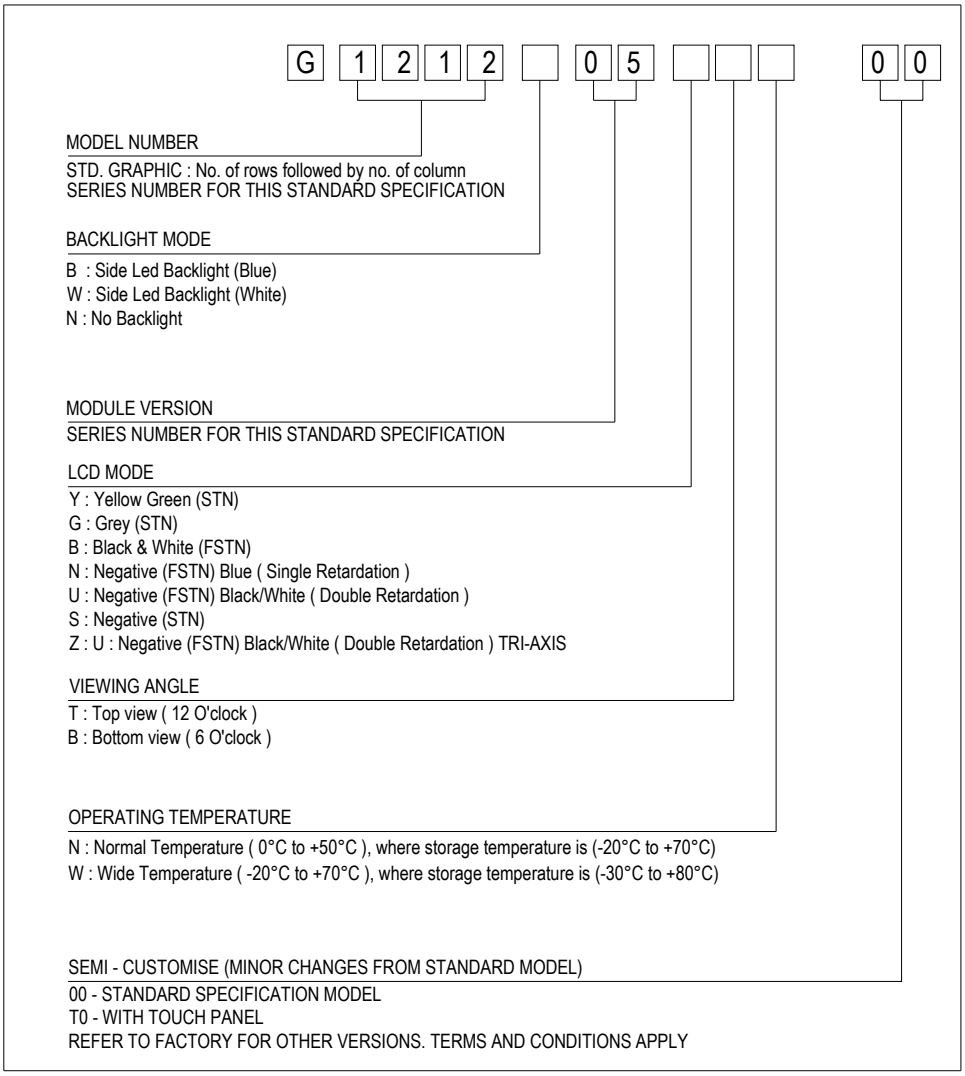
View area: 50.0 (w) x 50.0 (h) mm

Active area: 44.78 (w) x 44.78 (h) mm

General dimensions: 60.0 (w) x 63.0 (h) x 6.5 (t) mm

Controller/Driver: NT7506 or equivalent

Interface: Parallel



4.0 Absolute maximum rating (at Vss = 0V, ambient temperature = 25°C)

NO	ITEM	SIMBOL	MIN	MAX	UNIT
1.	Power Supply voltage (Logic)	$V_{DD} - V_{SS}$	0	7	V
2.	Power Supply voltage (LCD Driver)	$V_{EE} - V_0$	-	15	V
3.	Operating Temperature	T_{op}	Refer page 3		°C
4.	Storage Temperature	T_{st}	Refer page 3		°C

5.0 Electrical characteristics

NO	ITEM	SYMBOL	CONDITION	MIN	TYP	MAX	UNIT
1.	Power Supply voltage (Logic)	$V_{DD} - V_{SS}$	-	2.75	3.0	5.5	V
2.	Power Supply voltage (V_{LCD})	V_{adj}-V_{SS}	25°C	14.7±5%			V
3.	Input Voltage (except OSC1)	V_{IH}	-	$0.7V_{dd}$	-	V_{dd}	V
		V_{IL}	-	0	-	$0.3V_{dd}$	V
4.	Current Supply	I_{DD}	$V_{DD} - V_{SS} = 3V$	-	0.7	3.0	mA

5.1 Backlight Options

NO	COLOR	FORWARD VOLTAGE (V)			FORWARD CURRENT (mA)			MIN BRIGHTNESS (cd/m2) *
		Min	Typ.	Max	Min	Typ.	Max	
1.	White	-	5.0	-	-	40	60	350
2.	Blue	-	5.0	-	-	40	60	100

*Note : 1. Brightness measured at backlight surface.
2. On LCD surface, brightness is only about 10% to 15% of backlight brightness.
3. Lifetime of backlight: For YG, Amber, Red = 50K hrs. For White, Blue = 20K hrs

6.0 Environmental requirements

NO	ITEM	CONDITION
1.	Operating Temperature	Refer page 3
2.	Storage Temperature	Refer page 3
3.	Operating Humidity	5% to 95%RH
4.	Cycle Test	0 C @ 30 min to 50 C @ 30min for 1 cycle run for 10 cycles
5.	Lifetime	50000 HOURS (excluding backlight)

Note: The background on LCD has the possibility to be changed in different temperature range.

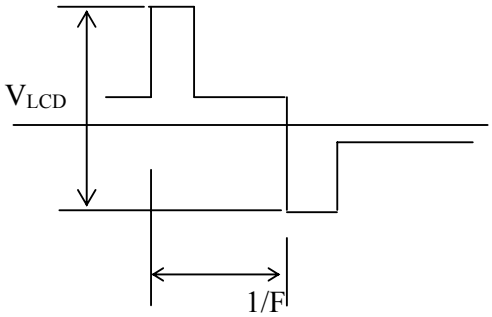
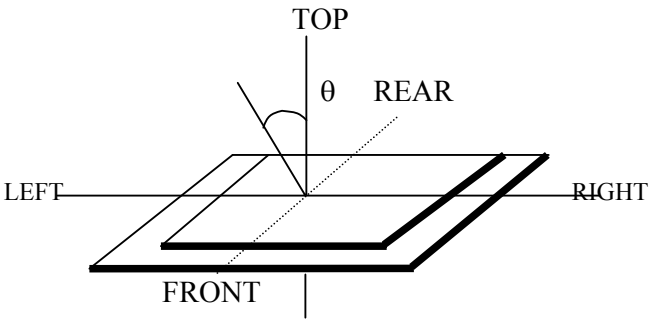
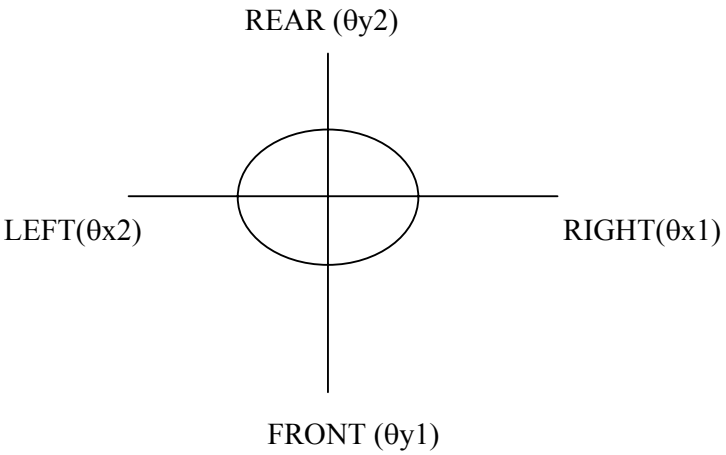
7.0 LCD specification

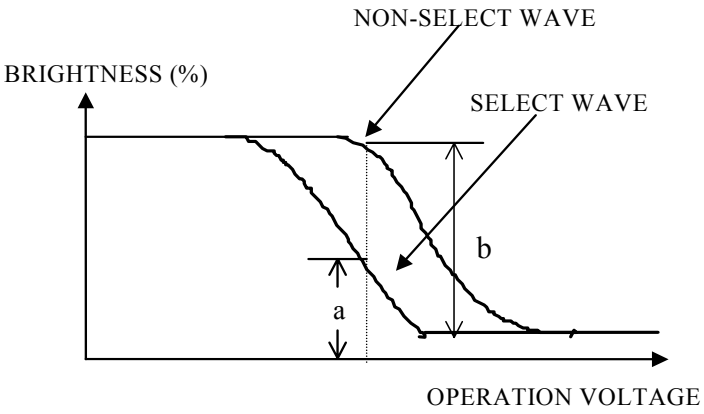
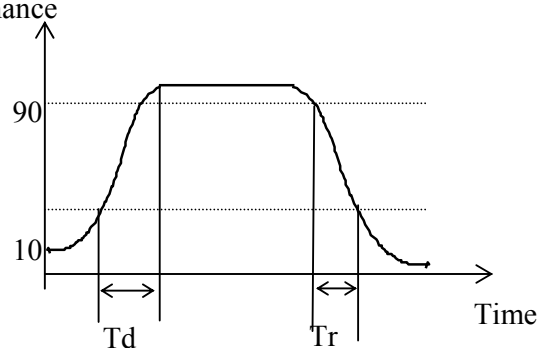
7.1 Electro-optical characteristics (at ambient temperature = 25°C)

NO	ITEM	SYMBOL	CONDITION	LCD TYPE							REF.
				STN YG	STN GREY	STN -VE BLUE	FSTN +VE B/W	FSTN –VE BLUE	FSTN -VE TRUE B/W	FSTN -VE TRI AXIS	
1	Operating Voltage (Volt)	V_{LCD}	θ = 0 Cr = max	14.7 ± 5%							7.1.1
2	Viewing Angle (Deg)	θ x 1	CR ≥ 2 V_{LCD} = 14.7V	+20	+15	+35	+20	+35	+30	+40	7.1.2
		θ x 2		-20	-15	-35	-20	-35	-35	-40	
		θ y 1		-25	-20	-30	-25	-30	-30	-50	
		θ y 2		+25	+20	+30	+25	+30	+30	+30	
3	Contrast Ratio	CR	$\theta = 0^0$ V_{LCD} =14.7V	2.5	2.0	5.5	2.5	5.5	15	15	7.1.3
4	Response Time (msec)	Rise Time (Tr)	$\theta = 0^0$	400							7.1.4
		Decay Time (Td)	$\theta = 0^0$	400							

Note:

1. Viewing angle data is based on bottom view product by default. Should it be a top view product, values are then swap.
2. Contrast ratio is based on typical data when using white colour as backlight.
3. Equipment Used Eldim; Ez Contrast 120R , Spot Size = 2mm

NO	CHARACTERISTICS	DEFINITIONS
7.1.1	***Definition of Operating Voltage (V_{LCD})***	 V_{LCD} : Operating Voltage F : Frame Frequency
7.1.2	***Definition of Viewing Angle***	 

7.1.3	***Definition of Contrast Ratio***	 Contrast Ratio = Brightness of non-selected state (b) / Brightness of selected state (a) ***Conditions*** (a) Operating Voltage: V_{LCD} (b) Temperature: 25°C (c) Viewing Angle, $\theta = 0^{o}$
7.1.4	*Response Time*	Luminance (%)  Tr: Measured between 10% and 90% of LCD segment maximum response with $V_{ON.}$ Td: With voltage switches to zero and the instant LCD segment reaches 10% of its maximum response.

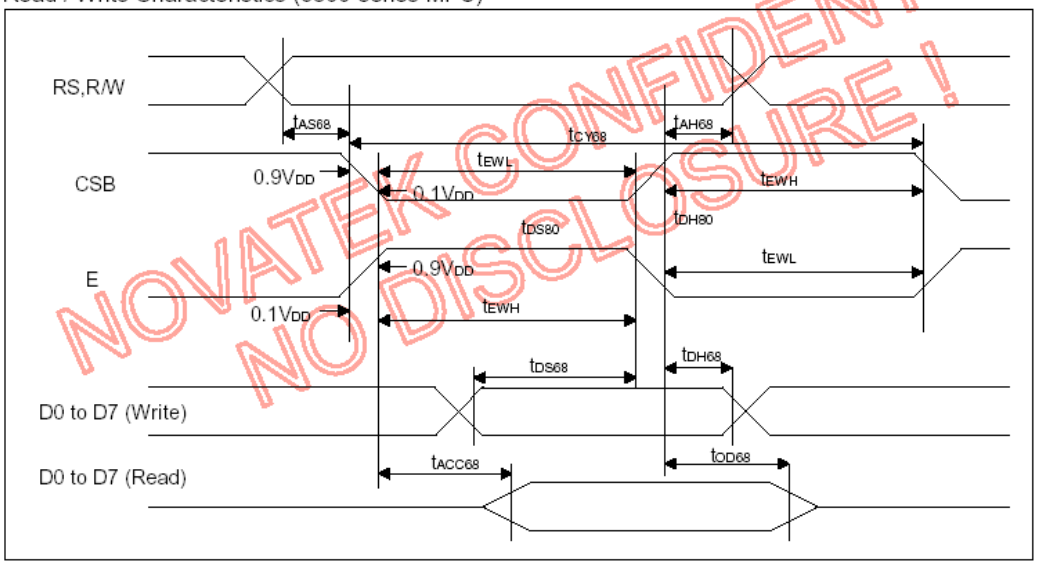
8.0 Interface

8.1	***Display Driver***	NT7506 OR EQUIVALENT	
8.2	***Duty Cycle***	1/128	
8.3	***Pin-out Assignments***		
	Pin No	**Symbol**	**Description**
	1	DB0	Bi-directional Data Bus.
	2	DB1	Bi-directional Data Bus.
	3	V_{SS}	Ground terminal of module
	4	DB2	Bi-directional Data Bus.
	5	DB3	Bi-directional Data Bus.
	6	V_{SS}	Ground terminal of module
	7	DB4	Bi-directional Data Bus.
	8	DB5	Bi-directional Data Bus.
	9	V_{SS}	Ground terminal of module
	10	DB6	Bi-directional Data Bus.
	11	DB7	Bi-directional Data Bus.
	12	V_{SS}	Ground terminal of module
	13	E/RD	Read select (active low)
	14	RS	Register Select Signal
	15	RESET	Reset (active low)
	16	V_{DD}	Supply Signal
	17	BL+	Backlight Power Supply
	18	BL+	Backlight Power Supply
	19	BL-	Backlight Ground
	20	BL-	Backlight Ground

9.0 Functional Descriptions

9.1 Read/Write timing characteristics

Read / Write Characteristics (6800-series MPU)



Read/Write characteristics (6800 series MPU)

(VDD = 1.8V, Ta=-40 ~ 85℃)

Symbol	Signal	Parameters	Min.	Typ.	Max.	Unit	Conditions
t_{AS68}	RS	Address setup time	0		-	ns	
t_{AH68}	RW	Address hold time	0		-	ns	
t_{CY68}		System cycle time for write	150		-	ns	
t_{CY68}		System cycle time for read	330		-	ns	
t_{EWH}	E_RD	Pulse width low	60		-	ns	
t_{EWL}	(E)	Pulse width time	60		-	ns	
t_{DS68}	DB0 to DB7	Data setup time	40		-	ns	
t_{DH68}		Data hold time	10		-	ns	
t_{ACC68}		Read access time	15		-	ns	CL=100pF
t_{OD68}		Output disable time	10		50	ns	

(VDD = 2.7V, Ta=-40 ~ 85℃)

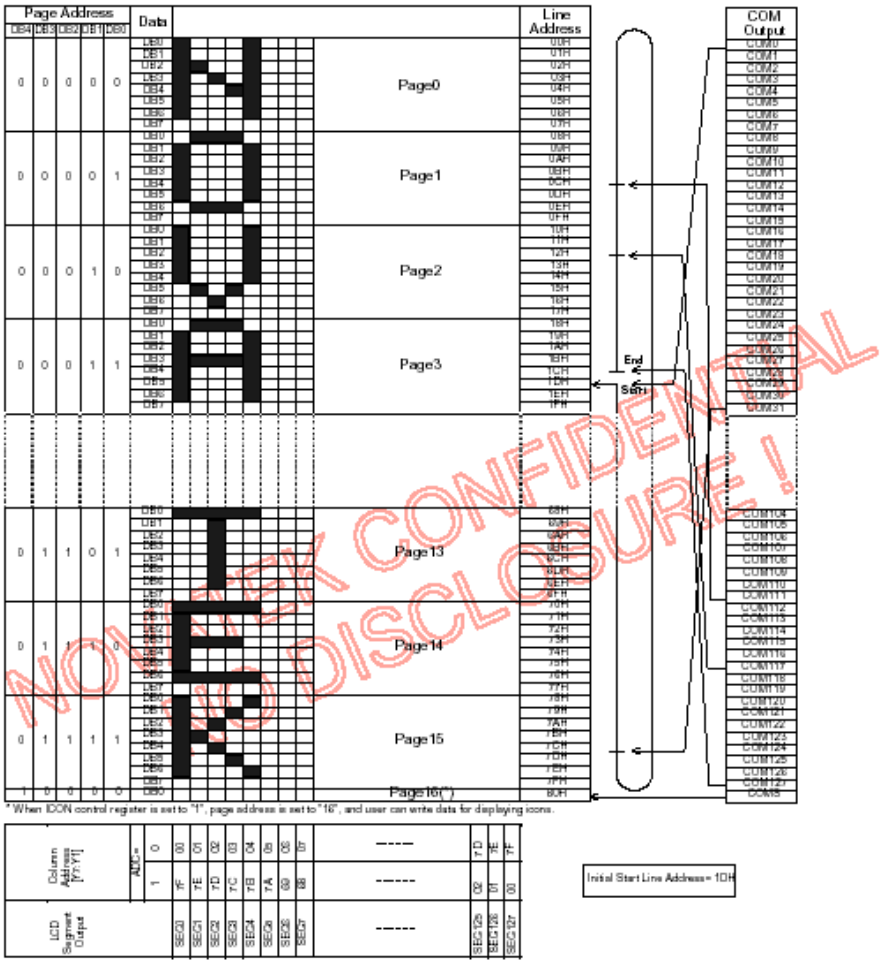
Symbol	Signal	Parameters	Min.	Typ.	Max.	Unit	Conditions
t_{AS68}	RS	Address setup time	0		-	ns	
t_{AH68}	RW	Address hold time	0		-	ns	
t_{CY68}		System cycle time for write	100		-	ns	
t_{CY68}		System cycle time for read	166		-	ns	
t_{EWH}	E_RD	Pulse width low	40		-	ns	
t_{EWL}	(E)	Pulse width time	40		-	ns	
t_{DS68}	DB0 to DB7	Data setup time	30		-	ns	
t_{DH68}		Data hold time	5		-	ns	
t_{ACC68}		Read access time	15		-	ns	CL=100pF
t_{OD68}		Output disable time	10		50	ns	

9.2 Column address and segment outputs

SEG Output	SEG 0	SEG 1	SEG 2	SEG 3		SEG 124	SEG 125	SEG 126	SEG 127
Column Address[Y7:Y1]	00H	01H	02H	03H		7CH	7DH	7EH	7FH
Internal Column Address[Y7:Y1]	00H 01H	02H 03H	04H 05H	06H 07H		F8H F9H	FAH FBH	FCH FDH	FEH FFH
Display Data(ADC=0)	1 1	1 0	0 0	0 1		1 1	0 0	1 0	0 1
LCD Panel Display									
Display Data(ADC=1)	0 1	1 0	0 0	1 1		0 1	0 0	1 0	1 1
LCD Panel Display									

9.3 Segment control circuit

This circuit controls the display data by the display ON/OFF, reverse display ON/OFF and entire display ON/OFF instructions wihtout changing the data in the display data RAM.

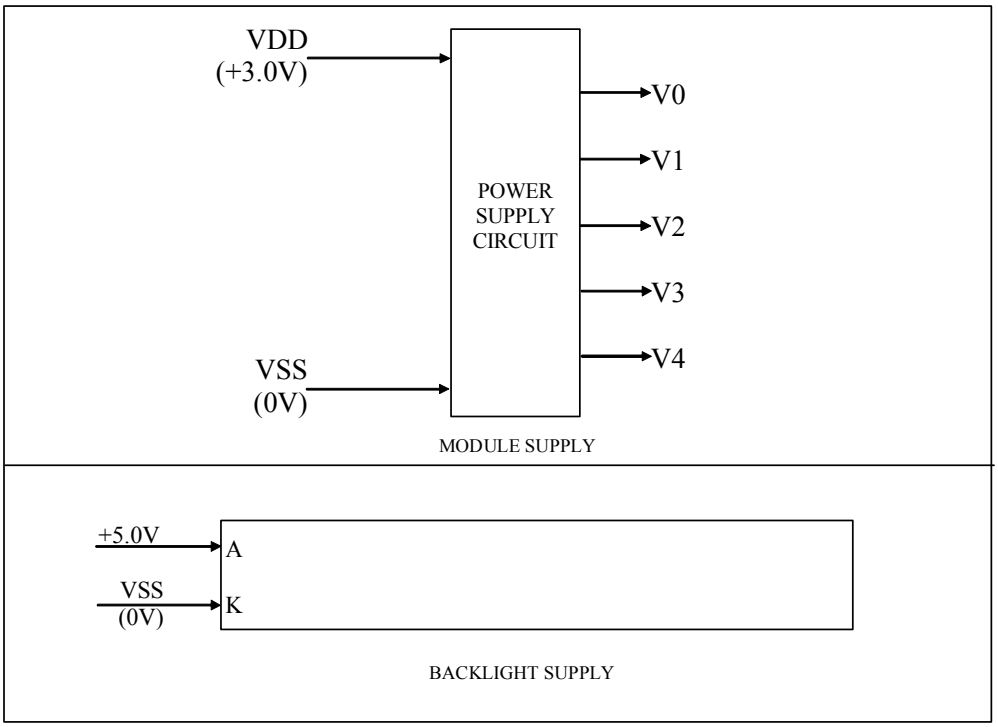


10. Instruction set

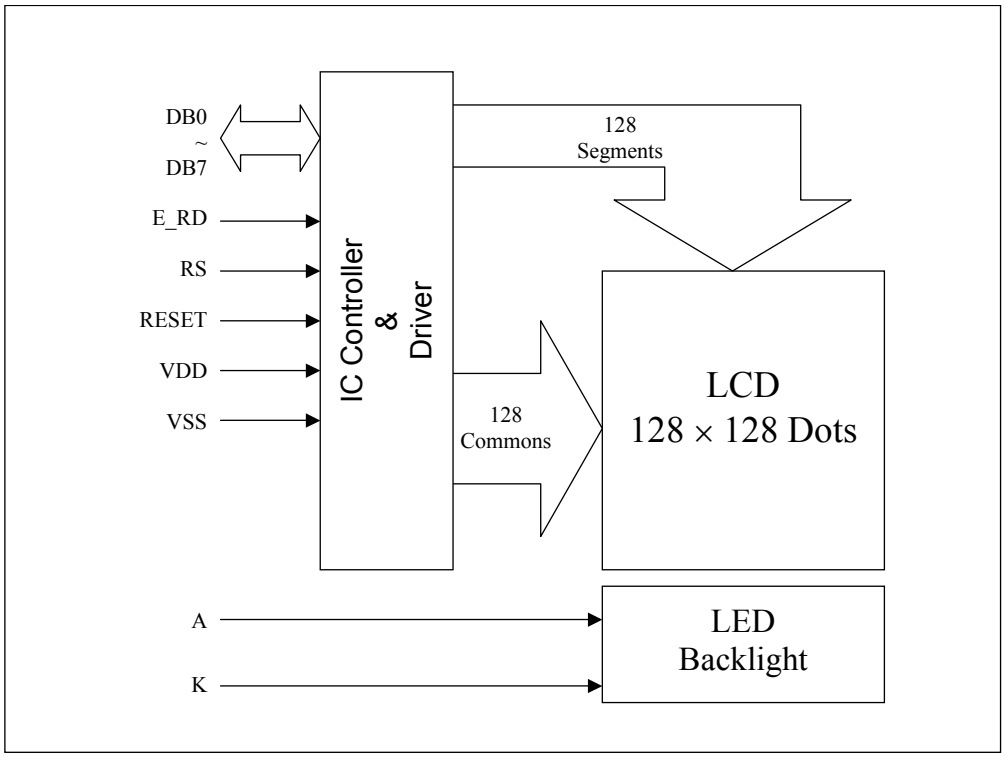
Instruction	RS	RW	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0	Description
Read display data	1	1	Read data								Read data from DDRAM
Write display data	1	0	Write data								Write data into DDRAM
Read status	0	1	BUSY	ON/ OFF	RES	0	0	0	1	0	Read the internal status
ICON control register ON/OFF	0	0	1	0	1	0	0	0	1	ICON	ICON=0: ICON disable (default) ICON=1: ICON enable & set the page address to 16
Set page address	0	0	1	0	1	1	P3	P2	P1	P0	Set page address
Set column address MSB	0	0	0	0	0	1	0	Y7	Y6	Y5	Set column address MSB
Set column address LSB	0	0	0	0	0	0	Y4	Y3	Y2	Y1	Set column address LSB
Set modify-read	0	0	1	1	1	0	0	0	0	0	Set modify-read mode
Reset modify-read	0	0	1	1	1	0	1	1	1	0	Release modify-read mode
Display ON/OFF	0	0	1	0	1	0	1	1	1	D	D=0:disply OFF D=1:display ON
Set initial display line register	0	0	0	1	0	0	0	0	×	×	2-byte instruction to specify the initial display line to realize vertical scrolling
	0	0	×	S6	S5	S4	S3	S2	S1	S0	
Set initial COM0 Register	0	0	0	1	0	0	0	1	×	×	2-byte instruction to specify the initial COM0 to realize vertical scrolling
	0	0	×	C6	C5	C4	C3	C2	C1	C0	
Set partial display duty ratio	0	0	0	1	0	0	1	0	×	×	2-byte instruction to set partial display duty ratio
	0	0	D7	D6	D5	D4	D3	D2	D1	D0	
Set N-line inversion	0	0	0	1	0	0	1	1	×	×	2-byte instruction to set N-line inversion register
	0	0	×	×	×	N4	N3	N2	N1	N0	
Release N-line inversion	0	0	1	1	1	0	0	1	0	0	Release N-line inversion mode
Reverse display ON/OFF	0	0	1	0	1	0	0	1	1	REV	REV=0: normal display REV=1:reverse display
Entire display ON/OFF	0	0	1	0	1	0	0	1	0	EON	EON=0:normal display EON=1:entire display ON
Power control	0	0	0	0	1	0	1	VC	VR	VF	Control power circuit operation
Select DC-DC step-up	0	0	0	1	1	0	0	1	DC1	DC0	Select the step-up of the internal voltage converter
Select regulator resistor	0	0	0	0	1	0	0	R2	R1	R0	Select internal resistance ratio of the regulator resistor
Set electronic	0	0	1	0	0	0	0	0	0	1	2-byte instruction to

volume register	0	0	×	×	EV5	EV4	EV3	EV2	EV1	EV0	specify the reference voltage
Select LCD bias	0	0	0	1	0	1	0	B2	B1	B0	Select LCD bias
SHL select	0	0	1	1	0	0	SHL	×	×	×	COM bi-directional selection SHL=0: normal direction SHL=1: reverse direction
ADC select	0	0	1	0	1	0	0	0	0	ADC	SEG bi-directional selection ADC=0: normal direction ADC=1: reverse direction
Oscillator on start	0	0	1	0	1	0	1	0	1	1	Start the built-in Oscillator
Set power save mode	0	0	1	0	1	0	1	0	0	P	P=0: normal mode P=1: sleep mode
Release power save mode	0	0	1	1	1	0	0	0	0	1	Release power save mode
Reset	0	0	1	1	1	0	0	0	1	0	Initialize the internal functions
Set data direction & display data length (DDL)	×	×	1	1	1	0	1	0	0	0	2-byte instruction to specify the number of data bytes
	×	×	D7	D6	D5	D4	D3	D2	D1	D0	
NOP	0	0	1	1	1	0	0	0	1	1	No operation
Test Instruction	0	0	1	1	1	1	×	×	×	×	Don't use this instruction
Set FRC and PWM	0	0	1	0	0	1	0	FRC	PWM1	PWM0	FRC (1:3 FRC,0:4 FRC) PWM1 PWM0 0 0 9PWM 0 1 9PWM 1 0 12PWM 1 1 15PWM
Set white mode and 1st/2nd frame, set pulse width	0	0	1	0	0	0	1	0	0	0	Set white mode and 1st/2nd frame
	0	0	WB3	WB2	WB1	WB0	WA3	WA2	WA1	WA0	
Set white mode and 3rd/4th frame, set pulse width	0	0	1	0	0	0	1	0	0	1	Set white mode and 3rd/4th frame
	0	0	WD3	WD2	WD1	WD0	WC3	WC2	WC1	WC0	
Set light gray mode and 1st/2nd frame, set pulse width	0	0	1	0	0	0	1	0	1	0	Set light gray mode and 1st/2nd frame
	0	0	LB3	LB2	LB1	LB0	LA3	LA2	LA1	LA0	
Set light gray mode and 3rd/4th frame, set pulse width	0	0	1	0	0	0	1	0	1	1	Set light gray mode and 3rd/4th frame
	0	0	LD3	LD2	LD1	LD0	LC3	LC2	LC1	LC0	
Set dark gray mode and 1st/2nd frame, set pulse width	0	0	1	0	0	0	1	1	0	0	Set dark gray mode and 1st/2nd frame
	0	0	DB3	DB2	DB1	DB0	DA3	DA2	DA1	DA0	
Set dark gray mode and 3rd/4th frame, set pulse width	0	0	1	0	0	0	1	1	0	1	Set dark gray mode and 3rd/4th frame
	0	0	DD3	DD2	DD1	DD0	DC3	DC2	DC1	DC0	
Set black mode and 1st/2nd frame, set pulse width	0	0	1	0	0	0	1	1	1	0	Set black mode and 1st/2nd frame
	0	0	BB3	BB2	BB1	BB0	BA3	BA2	BA1	BA0	
Set black mode and 3rd/4th frame, set pulse width	0	0	1	0	0	0	1	1	1	1	Set black mode and 3rd/4th frame
	0	0	BD3	BD2	BD1	BD0	BC3	BC2	BC1	BC0	

11. Power Supply

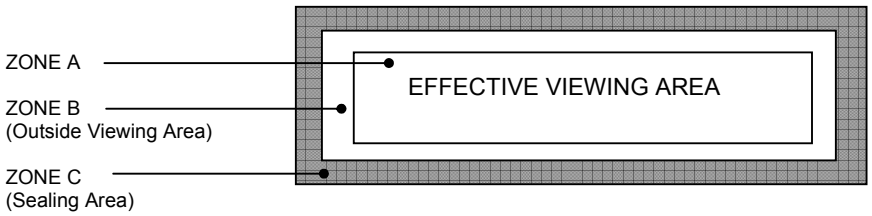


12. Block Diagram

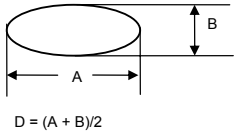


13.0 Quality Assurance

13.1 ZONE DEFINITION

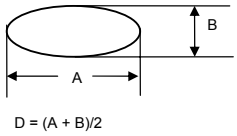


13.1.1 Black Spot, White Spot and Foreign Material (Solid Figure)

Defect Category	Defect Description	Criterion				Drawing Specification
Black Spot, White Spot and Foreign Material	Black Spot, White Spot and Foreign Material	Zone / Dimension	Acceptable No.			
			A	B	C	
		D ≤ 0.10mm	NC	NC	NC	
		0.10<D ≤ 0.15mm	3	3	NC	
		0.15 < D ≤ 0.25mm	1	2	NC	
		0.25 < D ≤ 0.35mm	1	1	NC	
		D > 0.35 mm	0	0	NC	
		NC: No count D: Mean Diameter of Defect				

The 1/3 or larger parts of individual dot has to be lighted on.
The solid figure is that the defect has clear-cut outline at the optimum driving condition in both positive and negative, of which size does not change when the contrast changes.

13.1.2 Black Spot, White Spot and Foreign Material (Faded Figure)

Defect Category	Defect Description	Criterion				Drawing Specification
Black Spot, White Spot and Foreign Material	Black Spot, White Spot and Foreign Material	Zone / Dimension	Acceptable No.			
			A	B	C	
		D ≤ 0.60mm	NC	NC	NC	
		0.60<D ≤ 0.70mm	3		NC	
		0.70 < D ≤ 0.80mm	1		NC	
		D > 0.80 mm	0		NC	
		NC: No count D: Mean Diameter of Defect				

The faded figure means that the defects has unclear outline at the optimum driving condition in both positive and negative, of which size seems to change when the contrast changes.

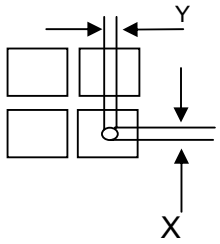
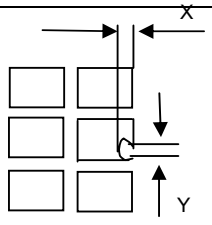
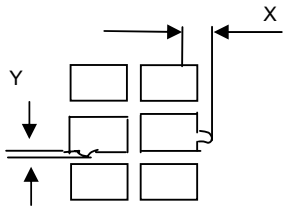
13.1.3 Line Shape and Scratches

<table>
<tr><th>Defect Category</th><th>Defect Description</th><th>Criterion</th><th>Drawing Specification</th></tr>
<tr><td>Line shape and scratches</td><td>Line shape and scratches</td><td>
<table>
<tr><td colspan="2">Zone /Dimension</td><td colspan="3">Acceptable No.</td></tr>
<tr><td>X</td><td>Y</td><td>A</td><td>B</td><td>C</td></tr>
<tr><td>NC</td><td>≤ 0.03mm</td><td>NC</td><td>NC</td><td>NC</td></tr>
<tr><td>≤ 2 mm</td><td>≤ 0.05mm</td><td>1</td><td>1</td><td>NC</td></tr>
<tr><td>≤ 1 mm</td><td>≤ 0.10mm</td><td>1</td><td>2</td><td>NC</td></tr>
<tr><td>NC</td><td>≥ 0.10mm</td><td colspan="3">Due to (1) round defect</td></tr>
</table>
</td><td></td></tr>
</table>

Length is the whole length and width the maximum width of foreign material.

Remark:
i) Total amount of spotting defects including round and linear:-
5 are the totally permissible numbers of defects in Zone A & B including above (13.1.1), (13.1.2), (13.1.3). In case of the total permissible, the minimum distance has to be 5mm or larger between every couple of defects.
ii) All the other items of inspection that are not included herein must be determined by the "Limit Standard" sample, which were occasionally set up with the mutual consent of both parties. In every case of the items set up with the Limit Standard, the Limit Standard always takes precedence over the other means of definition.

13.1.5 Pin Hole and Deformed Dots

<table>
<tr><td>Pin Hole</td><td>Pin hole / void at light up segment</td><td>
<table>
<tr><td>Zone / Dimension</td><td>Acceptable No.</td></tr>
<tr><td>Located inside single pixel/dot:-
(X + Y)/2 ≤ 0.20mm</td><td>- 1 per pixel/dot
- 3 per display (Active Area)</td></tr>
<tr><td>Laid over the plural pixel/dots:
(X + Y)/2 ≤ 0.20mm</td><td>- 1 per pixel/dot
- 3 per display (Active Area)</td></tr>
<tr><td colspan="2">(¾ or larger part of dot area has to be effective for display)</td></tr>
</table>
</td><td> 
</td></tr>
<tr><td rowspan="2">Deformed display dot</td><td>Lacked deformation</td><td>Accept if:
i) X ≤ 0.15 and
ii) Y ≤ 0.15</td><td> 
</td></tr>
<tr><td>Added deformation</td><td>Accept if:
i) X < 0.02 and
ii) Y < 0.02</td><td> 
</td></tr>
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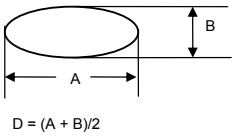
13.1.5 Polarizer Bubble/Foreign Material

<table>
<tr><td rowspan="6">Polarizer bubble /
Foreign material</td><td colspan="4">Criterion</td><td>Drawing Specification</td></tr>
<tr><td rowspan="2">Zone /
Dimension</td><td colspan="3">Acceptable No.</td><td rowspan="5"> 

D = (A + B)/2</td></tr>
<tr><td>A</td><td>B</td><td>C</td></tr>
<tr><td>D ≤ 0.30mm</td><td>NC</td><td>NC</td><td rowspan="3">NC if the Polarizer not lifted up/ peel off</td></tr>
<tr><td>D ≤ 0.50mm</td><td>2</td><td>NC</td></tr>
<tr><td>0.50 < D ≤ 0.60mm</td><td>1</td><td>2</td></tr>
<tr><td>D > 0.60mm</td><td>0</td><td>0</td><td colspan="2">NC: No count
D: Mean Diameter of Defect

3 are the totally permissible numbers of bubble</td></tr>
</table>

14. Precaution for using LCM

1. Liquid Crystal Display (LCD)

LCD is made up of glass, organic sealant, organic fluid and polymer based polarizers. The following precautions should be taken when handling.

b) Keep the temperature within the range of use and storage. Excessive temperature and humidity could cause polarization degredation, polarizer peel off or bubble.

c) Do not contact the exposed polarizer with anything harder than HB pencil lead. To clean dust off the display surface, wipe gently with cotton, chamois or other soft material soaked in petroleum benzin.

d) Wipe off saliva or water drops immediately. Contact with water over a long period of time may cause polarizer deformation or colour fading, while an active LCD with water condensation on its surface will cause corrosion of ITO electrodes.

e) Glass can be easily chipped or cracked from rough handling, especially at corners and edges.

f) Do not drive LCD with DC voltage.

2. Liquid Crystal Display Modules.

2.1 Mechanical Considerations

LCM are assembled and adjusted with a high degree of precision. Avoid excessive shocks and do not make any alterations or modification. The following should be noted.

a) Do not tamper in any way with the tabs on the metal frame.

b) Do not modify the PCB by drilling extra holes, changing its outline, moving its component or modifying its pattern.

c) Do not touch the elastomer connector, especially insert a backlight panel (for example, EL)

d) When mounting a LCM make sure that the PCB is not under any stress such as bending or twisting. Elastomer contacts are very delicate and missing pixels could result from slight dislocation of any of the elements.

a) Avoid pressing on the metal bezel, otherwise the elastomer connector could be deformed and lose contact, resulting in missing pixels.

2.2 Static Electricity

LCM contains CMOS LSI's and the same precaution for such devices should apply, namely

a) The operator should be grounded whenever he/she comes into contact with the module. Never touch any of the conductive parts such as the LSI pads, the copper leads on the PCB and the interface terminals with any parts of the human body.

b) The modules should be kept in antistatic bags or other containers to static for storage.

c) Only properly grounded soldering irons should be used.

d) If an electric screwdriver is used, it should be well grounded and shielded from commutator spark.

e) The normal static prevention measures should be observed for work clothes and working benches, the latter conductive (rubber) mat is recommended.

f) Since dry air is inductive to statics, a relative humidity of 50-60% is recommended.

2.3 Soldering

a) Solder only to the I/O terminals.

b) Use only soldering irons with proper grounding and no leakage.

c) Soldering temperature: 280 °C

d) Soldering time: 3 to 4 sec

e) Use eutectic solder with resin flux fill.

f) If flux is used, the LCD surface should be covered to avoid flux spatters. Flux residue should be removed afterwards.

2.4 Operation

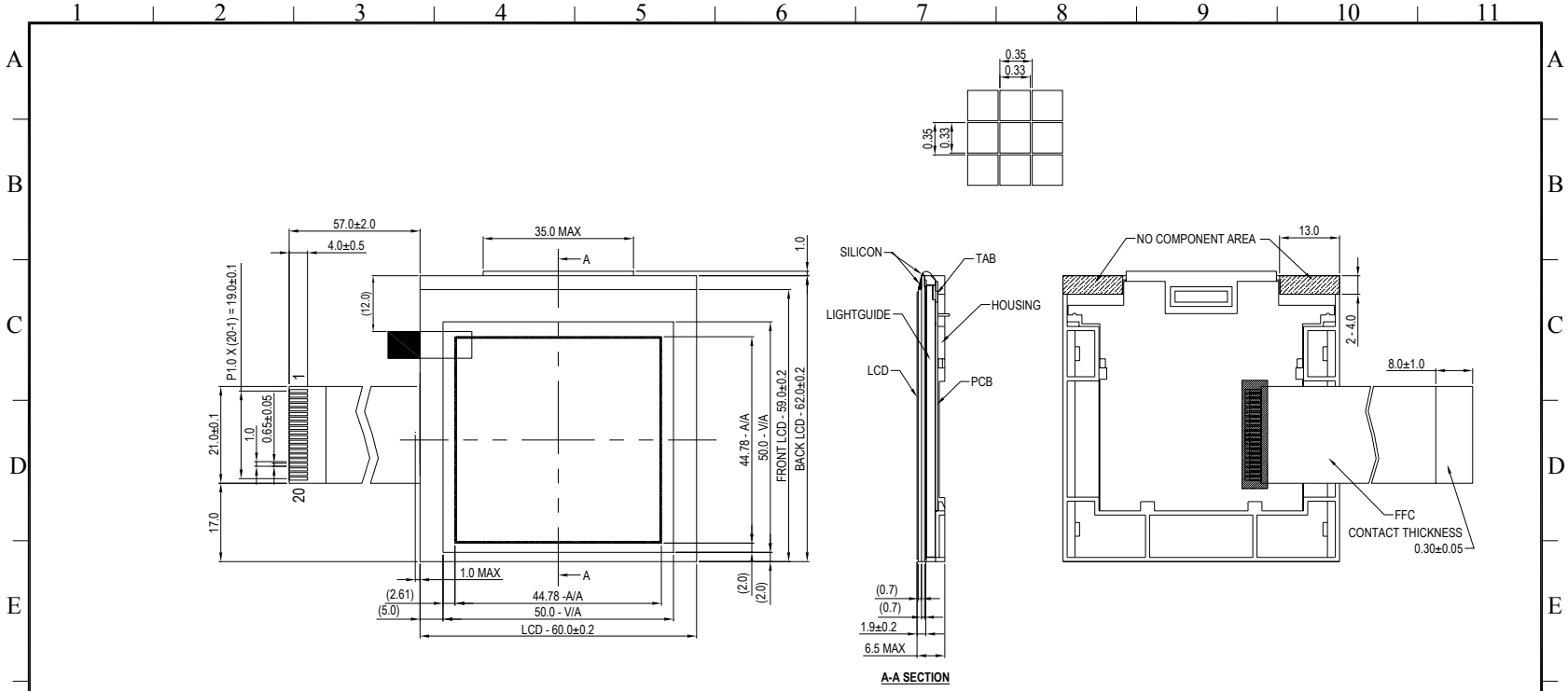
a) The contras can be adjusted by varying the LCD driving voltage V0
b) Driving voltage should be kept within specified range, excess voltage shortens display life.
c) Response time increases with decrease in temperature.
d) Display may turn black or dark blue at temperature above its operational range, this is (however not pressing on the viewing area) may cause the segments to appear "fractured".
e) Mechanical disturbance during operation (such as pressing on the viewing area) may cause the segments to appear "fractured".

2.5 Storage

If any fluid leaks out of the damage glass cell, wash off any human part that comes into contact with soap and water. Never swallow the fluid. The toxicity is extremely low but caution should be exercised at all the time.

2.6 Limited Warranty

Unless otherwise agreed between Crystal Clear Technology and customer, Crystal Clear Technology will replace or repair any of its LCD and LCM which is found to be defective electrically and visually when inspected in accordance with Crystal Clear Technology acceptance standards, for a period of one year from date of shipment. Confirmation of such date shall be based on freight documents. The warranty liability of Crystal Clear Technology is limited to repair and/or replacement on the terms set forth above. Crystal Clear Technology will not responsible for any subsequent or consequential events.



NOTE :
1. GENERAL TOLERANCE TO BE ±0.3.
2. OPERATING TEMPERATURE : 0°C TO 70°C
3. STORAGE TEMPERATURE : -30°C TO 80°C
4. LCD CONTROLLER NT7506 OR EQUIVALENT

PIN ASSIGNMENT

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
DB0	DB1	VSS	DB2	DB3	VSS	DB4	DB5	VSS	DB6	DB7	VSS	E_RD	RS	/RESET	VDD	LED+	LED+	LED-	LED-

NO	MODEL NAME	MATERIAL	REMARKS
1			

CRYSTAL CLEAR TECHNOLOGY SDN BHD
16, JLN TP5, TMN PERINDUSTRIAN SIME UEP,
47600 SUBANG JAYA, SELANGOR DARUL EHSAN.

PART NAME: MECHANICAL SPECIFICATION

APPROVED	CHECKED	DRAWN	UNIT : MM	DRAWING NUMBER	SHEET	REV.
		AZHAR 27-08-2008	NTS	G1212x05xxx00	1/1	1

Crystal Clear Technology

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