		CLOV	ER DISPLA	Y LTD.
		LCD MODULE	SPECIFICA	ΓΙΟΝ
		Model: CG12864	A	_ • _
			Revision	02
			Engineering	Timmy Kwan
			Date	18 July 2011
			Our Reference	X9040
ΓEL	k : (st FLOOR, EFFICIENCY HOUSE, KOWLOON, HONG KONG. 852) 2341 3238 (SALES OFFICE)	(852) 2342 8228 (GE	
TEL FAX	k : ((: ()	KOWLOON, HONG KONG. 852) 2341 3238 (SALES OFFICE) 852) 2357 4237 (SALES OFFICE)	(852) 2342 8228 (GE	
ADDRES FEL FAX E-MAIL URL	• • • • • • • • • • • • • • • • • • •	KOWLOON, HONG KONG. 852) 2341 3238 (SALES OFFICE)	(852) 2342 8228 (GE	

MODE OF DISPLAY

Display mode Display condition STN : Yellow green Reflective type Grey

Blue (negative)

FSTN positive **FSTN** negative

- Transflective type
- Transmissive type
- Others

Viewing direction

- 6 O' clock
- \square 12 O' clock
- \Box 3 O' clock
- 9 O' clock

LCD MODULE NUMBER NOTATION:

<u>CG12864A</u> -	N	N	- <u>S</u>	<u>R</u>	- <u>N 6</u>	– <u>T</u>	
1							

- (1) (2) (3) (4) (5) (6) (7) (8)
- *(1)---Model number of standard LCD Modules
- *(2)---Backlight type
 - N No backlight
 - E EL backlight
 - L Side-lited LED backlight
 - M– Array LED backlight
 - C CCFL

*(3)---Backlight color

- N No backlight
- A Amber
- B Blue
- O– Orange
- W-White
- Y Yellow green
- M Mutli Colour
- *(4)---Display mode
 - T TN
 - V TN (Negative)
 - S STN Yellow green
 - G STN Grey
 - B STN Blue (Negative)
 - F-FSTN
 - N FSTN (Negative)
- *(5)---Rear polarizer type
 - **R** Reflective
 - F Transflective
 - T Transmissive
- *(6)---Temperature range
 - N Normal
 - W– Extended
- *(7)---Viewing direction
 - 6 6 O'clock
 - 2 12 O'clock
 - 3 3 O'clock
 - 9-9 O'clock
- *(8)---Special code for other requirements
 - (Can be omitted if not used)

GENERAL DESCRIPTION

Display mode	:	128 X 64 dots, Graphic COG LCD module
Interface	:	Parallel/serial
Driving method	:	1/65 duty, 1/9 bias
Controller IC	:	Ultrachip UC1701X or equivalent For the detailed information, please refer to the IC specifications.

MECHANICAL DIMENSIONS

Item	Dimension	Unit	Item	Dimension	Unit
Outline Dimension			Dot Pitch	0.27(L)x0.27(W)	mm
No backlight	43.0(L) x29.14 (W) x2.1 (H)(MAX)	mm	Dot Size	0.255(L)x0.255(W)	mm
LED side-lited backlight	44.3(L) x30.14 (W) x 7.9(H)	mm	Viewing Area	37.04(L)x20.24(W)	mm

CONNECTOR PIN ASSIGNMENT

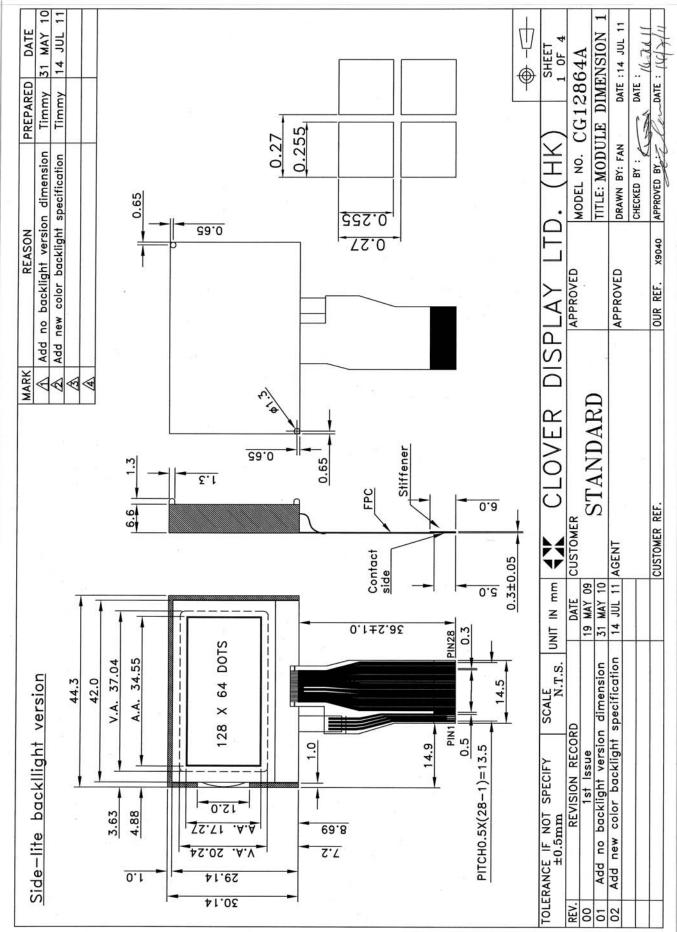
			-		
Pin No.	Symbol	Function	Pin No.	Symbol	Function
1	А	Supply voltage for backlight(+VE)	15	VDD	Power supply for logic(VDD)
2	K1	Supply voltage for backlight(-VE)	16	D7(SID)	Data bus(serial data)
3	*K2	For RGB	17	D6(SCK)	Data bus(serial clock)
4	*K3	For RGB	18	D5	
5	NC	No connection	19	D4	
6	BM1		20	D3	
7	BM0	Bus mode select	21	D2	Data bus
8	VLCDOUT	Main LCD assure suggla	22	D1	
9	VLCDIN	Main LCD power supply	23	D0	
10	VB1+		24	WR1	Dead/write exerction control
11	VB1-		25	WR0	Read/write operation control
12	VB0-	LCD bias voltage	26	CD	Register select
13	VB0+		27	RST	Reset
14	VSS	Power supply (0V)	28	CS0	Chip select

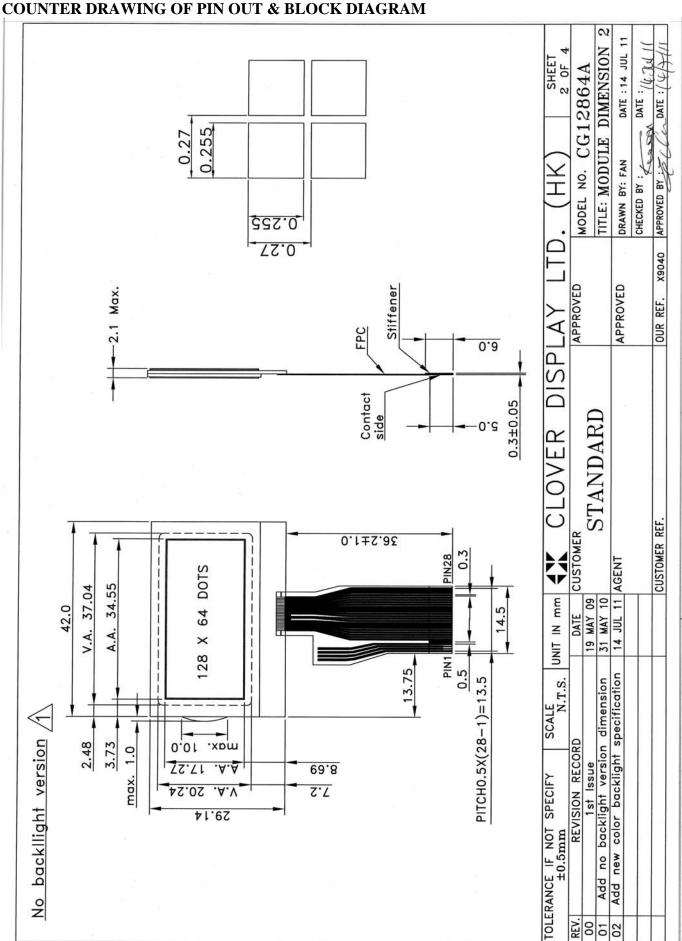
Note (*): Pin 3, 4 are used for RGB backlight version



CG12864A

COUNTER DRAWING OF MODULE DIMENSION





128X64 DOTS LCD PANEL 60 COM 564 DOTS LCD PANEL 60 00 561 to scora scora 52 00 561 to scora 561 to scora 571 to scora	FUNCTION	Supply voltage for backlight (+VE)	Supply voltage for backlight (-VE)	CB	connection	mode select	ICD power supply		LCD bias voltage		(AO) Alddns .	Power supply for logic(VDD)	Data bus (Serial data) Data hus (Serial alaat)			Sud		Read/write operation control	er select	select	22	(ILK) SHEET	• (111) 3 0F 4 MODEL NO. CG12864A	TITLE: PIN OUT & BLOCK DIAGRAM	DRAWN BY: FAN DATE : 14 JUL 11 CHECKED BY : DATE :	
128X64 DOTS LCD PANEL LCD PANEN LD SIGURA LD SIGURA		Supply	Supply For B	For R		Bus	Koin				Power			+			1	Read/	Register	Chip			<u>ه</u> . ۲	=	DRA	
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128X64 DOTS LCD PANEL LCD PANEL sect to sect28 sect to sect28 OUC1701X OR EQUIVALENCE WIT Normal Sectors *RGB backlight write and any UNT IN mm CLOVER DISE write and any write any write and any write any w	PIN NO.	*1	*2	**4	5	9	80	6 10	11	13	14	15	17	18	19	21	23	24	26	28		<		_	APPR	
ון הרופון או איז	178V61 DOTO		LCU PANEL	00	<u>ot 1</u>		SEG128	/ .			•		• UC1701X				side-lifed				de-lite backlight version only 38 side-lite backlight version only		DATE CUSTOMER	ton dimension 31 MAY 10	14 JUL 11	

SPEC. REV.02

CG12864A

ELECTRICAL CHARACTERISTICS

Conditions: VSS=0V, Ta=25°C

ELECTRICAL CHARACT	ERISTICS		C	onditions: $VSS=0V$,	Ta=25 ()
Item	Symbol	MIN.	TYP.	MAX.	Unit
Supply Voltage for Logic	VDD	3.05	3.3	3.55	V
Supply Current for Logic	IDD	_	0.29	0.43	mA
Operating Voltage for LCD (*)	VLCD	8.55	9.0	9.45	V
'High' Level Input Voltage	VIH	0.8VDD	—	_	v
'Low' Level Input Voltage	VIL	_		0.2VDD	V

Note (*): There is tolerance in optimum LCD driving voltage during production and it will be within the specified range.

Side-lited LED BL:

Constant voltage driving:

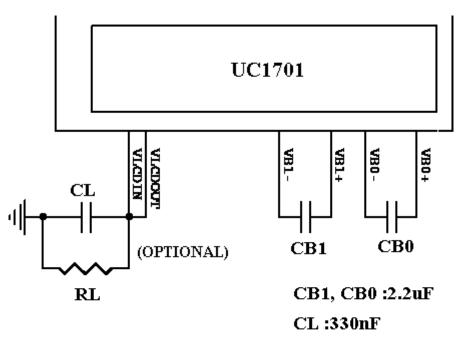
Item	Symbol	MIN.	TYP.	MAX.	Unit	Condition
Backlight current (White)	I_{BL}	—	15	20	mA	$V_{BL} = 3.3V$
Backlight current (Blue)	I_{BL}	—	15	20	mA	$V_{BL} = 3.3V$
Backlight current (Yellow Green)	I_{BL}	—	24	30	mA	$V_{BL} = 3.3V$
Backlight current (Red)	I_{BL}	_	24	30	mA	$V_{BL} = 3.3V$
Backlight current (Amber)	I_{BL}	—	24	30	mA	$V_{BL} = 3.3V$
Backlight current (Orange)	I_{BL}	_	24	30	mA	$V_{BL} = 3.3V$

RGB BL:

Constant voltage driving:

Item	Symbol	MIN.	TYP.	MAX.	Unit	Condition
Backlight current (Red)	I _{BL}	—	10	15	mA	$V_{BL} = 4.0V$
Backlight current (Green)	I _{BL}	—	15	20	mA	$V_{BL} = 4.0V$
Backlight current (Blue)	I _{BL}	—	15	20	mA	$V_{BL} = 4.0V$

REFERENCE CIRCUIT EXAMPLE



CG12864A

ABSOLUTE MAXIMUM RATINGS

Please make sure not to exceed the following maximum rating values under the worst application conditions

		<u> </u>	**	
Item	Symbol	Rating (for normal temperature)	Rating (for wide temperature)	Unit
Supply Voltage	Vdd	-0.3 to +4.0	-0.3 to +4.0	V
Input Voltage	VT	-0.4 to VDD +0.3	-0.4 to VDD +0.3	V
Operating Temperature	Topr	0 to 50	-20 to 70	°C
Storage Temperature	Tstg	-10 to 60	-30 to 80	°C

INSTRUCTIONS TABLE

The following is a list of host commands supported by UC1701x

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	ΒZ	MX	DE	RST	0	0	0	0	Get Status	
4.	Set Column Address LSB	0	0	0	0	0	0	#	#	#	#	Set CA [3:0]	0
4.	Set Column Address MSB	0	0	0	0	0	1	#	#	#	#	Set CA [7:4]	0
5.	Set Power Control	0	0	0	0	1	0	1	#	#	#	Set PC[2:0]	000b
6.	Set Scroll Line	0	0	0	1	#	#	#	#	#	#	Set SL[5:0]	0
7.	Set Page Address	0	0	1	0	1	1	#	#	#	#	Set PA[3:0]	0
8.	Set V _{LCD} Resistor Ratio	0	0	0	0	1	0	0	#	#	#	Set PC[5:3]	100b
9.	Set Electronic Volume	0	0	1	0	0	0	0	0	0	1		
9.	(double-byte command)	0	0	0	0	#	#	#	#	#	#	Set PM[5:0]	20H
10.	Set All-Pixel-ON	0	0	1	0	1	0	0	1	0	#	Set DC[1]	0b
11.	Set Inverse Display	0	0	1	0	1	0	0	1	1	#	Set DC[0]	0b
12.	Set Display Enable	0	0	1	0	1	0	1	1	1	#	Set DC[2]	0b
13.	Set SEG Direction	0	0	1	0	1	0	0	0	0	#	Set LC[0]	0b
14.	Set COM Direction	0	0	1	1	0	0	#	-	-	-	Set LC[1]	0b
15.	System Reset	0	0	1	1	1	0	0	0	1	0	System Reset	N/A
16.	NOP	0	0	1	1	1	0	0	0	1	1	No operation	N/A
17.	Set LCD Bias Ratio	0	0	1	0	1	0	0	0	1	#	Set BR	0b
18.	Set Cursor Update Mode	0	0	1	1	1	0	0	0	0	0	AC3=1, CR=CA	N/A
19.	Reset Cursor Update Mode	0	0	1	1	1	0	1	1	1	0	AC3=0, CA=CR.	N/A
20.	Set Static Indicator OFF	0	0	1	0	1	0	1	1	0	0	NOP	N/A
21.	Set Static Indicator ON	0	0	1	0	1	0	1	1	0	1	NOP	N/A
21.	Set Static Indicator	0	0	-	-	-	-	-	-	-	-	NOF	N/A
22.	Set Booster Ratio	0	0	1	1	1	1	1	0	0	0	NOP	00b
22.	(double-byte command)	0	0	0	0	0	0	0	0	#	#	NOF	000
23.	Set Power Save (compound command)	0	0	#	#	#	#	#	#	#	#	Display OFF & All Pixel ON	N/A
24.	Set Test Control	0	0	1	1	1	1	1	1	Т	T	For UCI only	N/A
24.	(double-byte command)	0	U	-	#	#	#	#	#	#	#	Do NOT use	IN/A
25.	Set Adv. Program Control 0	0	0	1	1	1	1	1	0	1	0		
	(double-byte command)	0	0	#	0	0	1	0	0	#	#	Set TC, WA[1:0]	90H
26.	Set Adv. Program Control 1	0	0	1	1	1	1	1	0	1	1	For UCI only	
	(double-byte command)	0	0	#	#	#	#	#	#	#	#	Set APC1	N/A

* Other than commands listed above, all other bit patterns result in NOP (No Operation).

RECOMMENDED INITIAL SETTINGS

Set ADV. Program Control (double-byte command) : FAH, 90H Set SEG Direction : A0H Set COM Direction : C8H Set LCD Bias Ratio : A2H Set VLCD Resistor Ratio : 25H Set Power Control : 2FH Set Electronic Volume(double-byte command) : 81H , 19H Set Cursor Update Mode: E0H Set Page Address (page=0): B0H Set Scroll Line (row=0): 40H Set Column Address (column=0) (double-byte command) : 00H(LSB), 10H(MSB) Set Display Enable: AFH

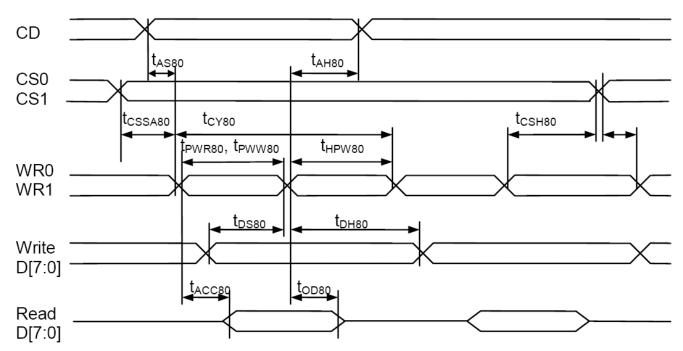
CG12864A

DISPLAY DATA RAM

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0001 D4 CCH C13 CE1 CE3 CE3 <td></td> <td>D2</td> <td>0AH</td> <td></td> <td>C11</td> <td>C59</td> <td>C54</td> <td></td> <td>C15</td> <td></td>		D2	0AH																C11	C59	C54		C15	
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D4 1CH C23 C13 C35 C29 C14 C25 C19 C60 C44 D6 1EH D7 1FH D C14 C25 C14 C25 C14 C25 C14 C25 C19 C60 C44 D0 20H D1 C14 <	0011	D3	1BH										Page 3						C28	C12	C37	C21	C62	C46
D6 1EH D7 C33 C15 C34 C18 C59 C43 D0 20H D1 21H D1 21H D2 22H D3 23H D3 C16 C51 C16 C57 C41 0100 D3 23H D5 22H D3 C16 C53 C17 C32 C16 C57 C41 05 29H D5 C33 C17 C32 C16 C57 C41 05 29H D5 C33 C17 C32 C16 C57 C41 05 29H D5 C33 C17 C32 C16 C57 C41 0101 C33 C37 C17 C32 C16 C51 C35 0101 D3 28H D1 D D D D C41 C26 C24 C28 C43 C27 C22 C6 C44 C28 C44 C28 C41 C26 C44 C28 C21 C5 C48 C33 <td< td=""><td>0011</td><td>D4</td><td>1CH</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>rageo</td><td></td><td></td><td></td><td></td><td></td><td>C29</td><td>C13</td><td>C36</td><td>C20</td><td>C61</td><td>C45</td></td<>	0011	D4	1CH										rageo						C29	C13	C36	C20	C61	C45
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0100 D4 24H D5 25H D6 26H D7 27H D0 28H D1 29H D2 28H D1 29H D2 28H D2 28H D4 20H D2 28H D4 20H D5 20H D5 20H D5 20H D5 20H D5 38H D4 20H D5 38H D4 20H D5 38H D4 34H D5 38H D6 38H D7 37H D6 38H D7 37H <td></td> <td>\square</td> <td></td> <td>_</td> <td></td> <td></td> <td></td> <td></td>																		\square		_				
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D6 26H C39 C23 C26 C10 C51 C35 0101 28H 0																		-						
D7 27H D0 28H D1 C40 C42 C25 C9 C50 C34 D1 29H D2 2AH D2 2AH D2 C40 C24 C25 C29 C50 C34 C32 C41 C25 C24 C68 C49 C33 C44 C32 C43 C27 C22 C6 C47 C31 C44 C28 C20 C44 C28 C20 C44 C28 C20 C44 C28 C29 C44 C28 C20 C44 C28 C20 C44 C28 C20 C44 C28 C21 C1 C44 C28 C21 C1 C44 C28 C21 C1 C44 C24 C26 C46 C30 C11 C44 C28 C21 C44 C22 C46 C33 C11 C23 C24 C25 C36 C11 C1 C23 C21 C1 C1 C1<														-										
D0 28H D1 29H D2 2AH D3 2BH D4 2CH D5 2DH D6 2EH D7 2FH D1 23H D1 23H D6 2EH D7 2FH D0 30H D1 31H D2 23H D1 31H D2 23H D1 31H D2 23H D1 31H D2 33H D4 D1 D3 38H D1 39H D2 3AH D1 39H D2 3AH D3 BH <t< td=""><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>\square</td><td></td><td></td><td></td><td></td><td></td><td></td></t<>																		\square						
D1 29H D2 2AH D4 2CH D5 2DH D6 2EH D7 2FH D7 2FH D0 30H D2 32H D7 2FH D7 2FH D2 32H D7 2FH D2 33H D2 32H D3 33H D2 32H D3 33H D2 32H D3 33H D2 32H D4 2 D5 35H D6 36H D7 37H D0 38H D1 39H D2 3AH D2 3AH D2 3AH D2 3AH D2 3AH D3 38H D2 3AH <t< td=""><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>-</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>_</td><td></td><td></td><td></td><td></td></t<>										-										_				
D2 2AH Clip Cl																				_				
0101 D3 2BH D4 2CH D5 2DH D6 2EH D7 2FH D0 30H D1 31H D2 32H D6 3BH D6 36H D1 38H D1 38H																								
D4 2CH C4 C45 C29 C20 C4 C45 C29 D6 2EH D7 2FH D0 30H D1 C45 C29 C20 C4 C45 C29 D0 30H D0 30H D0 C45 C29 C20 C4 C42 C28 D0 30H D0 C4 C45 C29 C20 C4 C42 C28 D1 31H D1 D1 D1 C50 C34 C15 C41 C28 D1 31H D1 D1 D1 C50 C34 C15 C41 C28 D1 31H D1 D1 D1 D1 C51 C35 C14 C20 C53 C37 C12 C20 C33 C21 C33 C21 C33 C21 C33 C11 C37 C22 C33 C11 C37 C21 C20 C34 C18 C20 C55 C39 C10 C33 C17 C34 C19	0404	D3											D						C44	C28		C5	C46	
D6 2EH C47 C31 C18 C2 C43 C27 D0 30H 0	0101	D4	2CH										Page 5						C45	C29	C20	C4	C45	C29
D7 2FH C <thc< th=""> C C <thc< th=""></thc<></thc<>		D5	2DH																C46	C30	C19	C3	C44	C28
D0 30H C49 C33 C16 C41 C25 0110 D3 33H D3 C43 C16 C40 C24 0110 D3 33H D4 D4 A4H D5 35H D6 C36H		D6	2EH																C47	C31	C18	C2	C43	C27
D1 31H C <thc< th=""> <thc< th=""> C <thc< th=""></thc<></thc<></thc<>		D7	2FH																C48	C32	C17	C1	C42	C26
D2 32H D3 33H C1 C3 C3 C3 C3 C23 D110 D3 33H D4 34H D5 35H C4 C3 C21 D6 36H D7 37H C3 C1 C3 C1 C3 C1 C3 C21 D0 38H D1 39H C3 C5 C4 C3 C1 C3 C1 C3 C1 C3 C21 D0 38H D2 3AH D2 D4 D4 D4 C6 C5 C39 C10 C36 C19 D1 39H D2 3AH D2 D4 D4 </td <td></td> <td></td> <td>30H</td> <td></td> <td>C49</td> <td>C33</td> <td></td> <td></td> <td>C41</td> <td>C25</td>			30H																C49	C33			C41	C25
D2 32H D3 33H C1 C3 C3 C3 C3 C23 D110 D3 33H D4 34H D5 35H C4 C3 C21 D6 36H D7 37H C3 C1 C3 C1 C3 C1 C3 C21 D0 38H D1 39H C3 C5 C4 C3 C1 C3 C1 C3 C1 C3 C21 D0 38H D2 3AH D2 D4 D4 D4 C6 C5 C39 C10 C36 C19 D1 39H D2 3AH D2 D4 D4 </td <td></td> <td>D1</td> <td></td> <td>\square</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>		D1																\square						
0110 D4 34H D5 35H D6 36H D7 37H D0 38H D1 39H D2 3AH D2 3AH D2 3AH D2 3AH D4 C63 C63 C37 C12 C36 C20 C55 C39 C10 C35 C19 C57 C41 C8 C33 C17 D2 3AH C58 C42 C7 C33 C14 D4 3CH C31 C15 C60 C44 C5 C33 C14 C61 C45 C4 C29 C13 C62 C46 C3 C20 C13 C62 C46 C3 C21 C64 C42 C4 C29 C13 C62 C46 C4		D2												⊢				⊢┦		_				
D4 34H D5 35H D6 36H D7 37H D0 38H D1 39H D2 3AH D1 39H D2 3AH D1 39H D2 3AH D1 39H D2 3AH D4 3CH D5 3DH D4 CH D1 39H D2 3AH D4 CH D4 CH D4 CH D4 CH D5 3DH D6 SEH D7 SFH 1000 D0 40H CH D7 SFH D6 SEH D7 SFH D0 CH CH D7 SFH D00 40H D7 SFH D00 CH CH CH D7 <td>0110</td> <td></td> <td></td> <td></td> <td>-</td> <td></td> <td></td> <td>-</td> <td></td> <td>—</td> <td></td> <td></td> <td>Page 6</td> <td>⊢</td> <td></td> <td>_</td> <td></td> <td>⊢┦</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>	0110				-			-		—			Page 6	⊢		_		⊢┦						
D6 36H D7 37H D0 38H D1 39H D2 3AH D2 3AH D2 3AH D3 3BH D4 3CH D5 3DH D6 3EH D7 3FH D0 40H Page 7 C55 C62 C40 C9 C32 C16 C63 C42 C7 C30 C14 C64 C45 C29 C13 C62 C46 C3 C29 C13 C62 C46 C3 C29 C11 C63 C47 C2 C28 C12 C63 C47 C2 C28 C12 C64 C48 C1 C26 C10 C100 D0 D0 D0 D0 D0 D0							\vdash		\vdash				-	⊢	\vdash		-	⊢┨						
D7 37H D0 38H D1 39H D2 3AH D2 3AH D3 3BH D4 3CH D5 3DH D6 3EH D7 3FH 1000 D0 40H C D5 3DH D7 3FH 1000 D0 40H C C0 C							\vdash							⊢			-	⊢┨						
D0 38H D1 39H D2 3AH D2 3AH D2 3AH D3 3BH D4 3CH D5 3DH D6 3EH D7 3FH 1000 D0 40H C C C C C C C D7 3FH 1000 D0 A0H C C C C C C C C C D7 SFH C C C C C C C C C C C C C C C C C C C C C C C C														⊢			-	┝─┦						
D1 39H D2 3AH D2 3AH D3 3BH D4 3CH D5 3DH D6 3EH D7 3FH 1000 D0 40H Page 8 C C1C C1C C1C														-			-	┝━┩						
D2 3AH 0111 D3 3BH D4 3CH D5 3DH D6 3EH D7 3FH 1000 D0 40H C C C C C C C D C C D C C D C C C D C C C D <										\vdash				⊢			-	⊢┨						
0111 D3 3BH D4 3CH D5 3DH D6 3EH D7 3FH 1000 D0 40H C C C C C C C C C C C D6 3EH D7 3FH D00 D0 C C C C C C C C C C C C C C C C D100 D0 D00 W C C C C C C C C C C C C C C C C C C C C C C C C <t< td=""><td></td><td></td><td></td><td></td><td></td><td>\vdash</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>⊢</td><td></td><td></td><td>-</td><td>⊢-1</td><td></td><td></td><td></td><td></td><td></td><td></td></t<>						\vdash								⊢			-	⊢-1						
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D5 3DH D6 3EH D7 3FH 1000 D0 40H Page 8 C C1 C1 C1 C	0111												Page 7	F				-1						
D6 3EH D7 3FH 1000 D0 40H V V 0 V V 0 V V 0 V V 0 V V 0 V V 0 V V 0 V V 0 V V <																		1		_				
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MX 0 1 0 SEG132 SEG132 SEG1 SEG131 SEG131 SEG3 SEG132 SEG131 SEG3 SEG133 SEG31 SEG3 SEG131 SEG3 SEG3 SEG123 SEG3 SEG3 SEG123 SEG3 SEG3 SEG3 SEG128 SEG3 SEG3 SEG3 SEG3																					65			49
MX 0 SEG132 SEG SEG131 SEG SEG131 SEG SEG131 SEG SEG132 SEG SEG133 SEG SEG133 SEG SEG133 SEG SEG133 SEG SEG126 SEG SEG3 SEG1 SEG1 SEG1 SEG3 SEG1 SEG1 SEG1 SEG1 SEG1 SEG1 SEG1 SEG1 SEG1 SEG1 SEG1					2	5	3	4	5	9	2	8		28	29	30	3	32				M	UX	
1 1 SEG132 \$ SEG123 \$ SEG3 \$				0	ЩÜ	ЯĞ	ЩÜ	ШÜ	В	ЯÜ	ЩĞ	ЕG		ð	ð	5	õ	<u>ö</u>						
A 1 1 SEG132 SEG132 SEG131 SEG132 SEG130 SEG131 SEG130 SEG127 SEG126 SEG126 SEG126 SEG126 SEG3 SEG3 SEG3 SEG3 SEG3 SEG3 SEG3 SEG3			¥			S				S				SE	SE	SE	SE	SE						
SEG SEG SEG SEG SEG SEG SEG SEG SEG SEG			2		132	131	30	129	128	27	126	125		35	4	ŝ	2	5						7
				-	Ö	ò	ò	ò	ò	ò	ò	Ö		ЭЩ ЭЩ	ы Ш	ЭЩС С	ЭЩ.	ы Ш						
					SI	SI	SI	SL	SE	SI	SE	SE		0)	5	55	55	"						

Example for memory mapping: let MX = 0, MY = 0, SL = 0, according to the data shown in the above table:

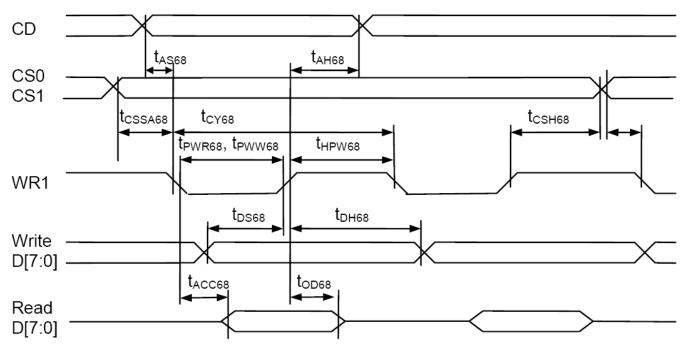
PARALLEL INTERFACE TIMING DIAGRAM(8080 MODE)



PARALLEL INTERFACE TIMING CHARACTERISTICS (8080 MODE)

Symbol	Signal	Descr	ription	Condition	Min.	Max.	Units	
t _{AS80}	CD	Address	setup time		0		nS	
t _{AH80}	CD	Address	hold time		5	_	115	
t _{CSSA80}	CS1/CS0	Chip select	setup time		5		nS	
t _{CSH80}	051/050	Chip select	hold time		5	_	113	
t _{CY80}		Cycle time	read		120		nS	
LCY80		Cycle time	write		80	_	110	
t _{PWR80}	WR1	Pulse width	read		60		nS	
t _{PWW80}	WR0		write		40	_	no	
t _{HPW80}	WR0, WR1	High pulse	read		60	_	nS	
CHPVV80		width	write		40	_	no	
t _{DS80}	D7~D0	Data	setup time		30		nS	
t _{DH80}		Data	hold time		0	_	10	
t _{ACC80}		Read access		C _L = 100pF	_	60	nS	
t _{od80}		Output disab	le time		20	-	10	

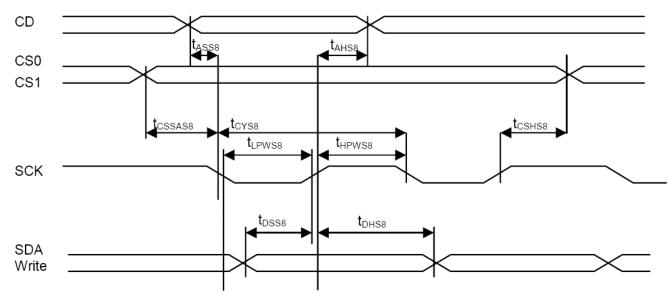
PARALLEL INTERFACE TIMING DIAGRAM(6800 MODE)



PARALLEL INTERFACE TIMING CHARACTERISTICS (6800 MODE)

Symbol	Signal	Desci	ription	Condition	Min.	Max.	Units
t _{AS68}	CD	Address	setup time		0		nS
t _{AH68}	CD	Address	hold time		0	_	110
t _{CSSA68}	CS1/CS0	Chip select	setup time		5		nS
t _{CSH68}	031/030	Chip select	hold time		5	_	10
t _{CY68}		System	read		120		nS
LCY68		cycle time	write		80	_	110
t _{PWR68}	WR1	Pulse width	read		60	_	nS
t _{PWW68}	VVI (1		write		40		no
t _{HPW68}		High pulse	read		60	_	nS
ULL 100		width	write		40		no
t _{DS68}	D7~D0	Data	setup time		30	_	nS
t _{DH68}	07 00	Data	hold time		0	_	10
t _{ACC68}		Read access		C _L = 100pF	_	60	nS
t _{od68}		Output disab	le time		50	_	

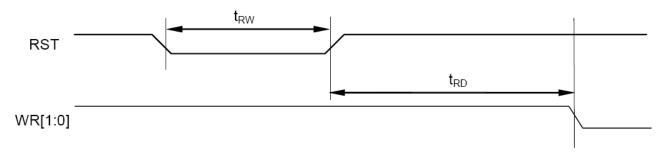
SERIAL INTERFACE TIMING DIAGRAM (FOR S8)



SERIAL INTERFACE TIMING CHARACTERISTICS (FOR S8)

S	ymbol	Signal	Descri	ption	Condition	Min.	Max.	Units
	t _{ASS8}	CD	Address	setup time		0	_	nS
	t _{AHS8}	00	///////////////////////////////////////	hold time		0		no
to	CSSAS8	CS1/CS0	Chip select	setup time		5		nS
t	tcsHs8		Chip select	hold time		5	_	10
	t	/S8	Cycle time	read		100		nS
	t _{CYS8}		Cycle time	write		30	_	110
	ŀ	SCK	Low pulse	read		50		nS
· ۱	t _{lpws8}	SCK	width	write		15	_	110
+			High pulse	read		50		nS
L L	t _{HPWS8}		width	write		15	_	110
	t _{DSS8}	SDA	Dete	setup time		12		nS
	t _{DHS8}		Data	hold time		0	_	110

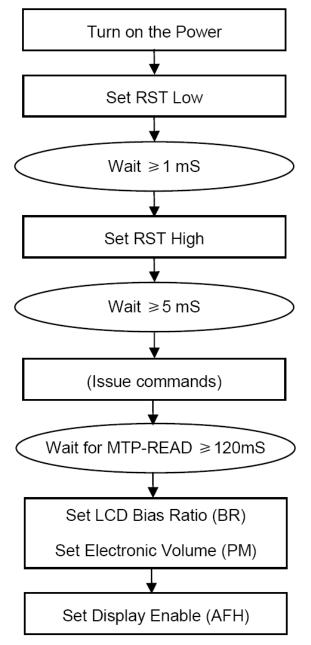
RESET TIMING DIAGRAM



RESET TIMING

Symbol	Signal	Description	Condition	Min.	Max.	Units
t _{RW}	RST	Reset low pulse width		3	-	μS
t _{RD}	RST, WR	Reset to WR pulse delay		6	-	mS

INITIALIZING WITHOUT THE BUILT-IN POWER SUPPLY CIRCUITS



ELECTRO-OPTICAL CHARACTERISTICS

MEASURING CONDITION:

POWER SUPPLY = Vop / 64 Hz TEMPERATURE = 23 ± 5 °C RELATIVE HUMIDITY = 60 ± 20 %

ITEM	SYMBOL	UNIT	TYP. STN
RESPONSE TIME	Ton	ms	220
	Toff	ms	280
CONTRAST RATIO	Cr	-	12
	V3:00	0	40
VIEWING ANGLE	V6:00	0	70
$(Cr \ge 2)$	V9:00	0	40
	V12:00	0	50

THE ELECTRO-OPTICAL CHARACTERISTICS ARE MEASURED VALUE BUT NOT GUARANTEED ONES.

RELIABILITY OF LCD MODULE

	TEST CONDITION	TEST CONDITION		
ITEM	FOR NORMAL TEMPERATURE	FOR WIDE TEMPERATURE	TIME	
High temperature operating	50°C	70°C	240 hours	
Low temperature operating	0°C	-20°C	240 hours	
High temperature storage	60°C	80°C	240 hours	
Low temperature storage	-10°C	-30°C	240 hours	
Temperature-humidity storage	40°C 90% R.H.	60°C 90% R.H.	96 hours	
Temperature cycling	-10°C to 60°C	-30°C to 80°C	5 avala	
	30 Min Dwell	30 Min Dwell	5 cycle	
Vibration Test at LCM Level	Freq 10-55 Hz	Freq 10-55 Hz		
	Sweep rate: 10-55-10 at 1 min	Sweep rate: 10-55-10 at 1 min		
	Sweep mode Linear	Sweep mode Linear	—	
	Displacement: 2 mm p-p	Displacement: 2 mm p-p		
	1 Hour each for X, Y, Z	1 Hour each for X, Y, Z		

QUALITY STANDARD OF LCD MODULE

1.0 Sampling M	lethod
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Sampling Plan : MIL STD 105 E Class of AQL : Level II/Single Sampling Critical : 0.25% Maior 0.65% Minor 1.5%

		or 0.65% Minor 1.5%	
2.0	Defect Group	Failure Category	Failure Reasons
	Critical Defect	Malfunction	Open
	0.25%(AQL)		Short
			Burnt or dead component
			Missing part/improper part P.C.B.
			Broken
	Major Defect	Poor Insulation	Potential short
	0.65%(AQL)		High current
			Component damage or scratched
			or Lying too close improper coating
		Poor Conduction	Damage joint
			Wrong polarity
			Wrong spec. part
			Uneven/intermittent contact
			Loose part
			Copper peeling
			Rust or corrosion or dirt's
	Minor Defect	Cosmetic Defect	Minor scratch
	1.5%(AQL)		Flux residue
			Thin solder
			Poor plating
			Poor marking
			Crack solder
			Poor bending
			Poor packing
			Wrong size

SAMPLING METHOD

CLASS OF AQL: LEVEL II/ SINGLE SAMPLING MAJOR-0.65% MINOR – 1.5%

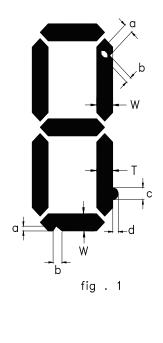
QUALITY STANDARD

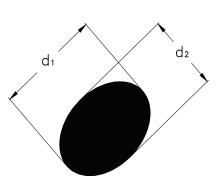
DEFECT	CRITER	RIA	ТҮРЕ	FIGURE
SHORT CIRCUIT	-		MAJOR	-
MISSING SEGMENT	-		MAJOR	-
UNEVEN / POOR CONTRAST	-		MAJOR	-
CROSS TALK	-		MAJOR	-
PIN HOLE	$MAX(a,b) \leq$	1 / 4 W	MINOR	1
EXCESS SEGMENT	$MAX(c,d) \leq$	1 / 4 T	MINOR	1
BUBBLES	d* ≥ 0.2	QTY=0	MINOR	2
BLACKS SPOTS	$d \leq 0.3$	N.A.**	MINOR	2
	0.3 <d≤0.4< td=""><td>QTY≤1</td><td></td><td></td></d≤0.4<>	QTY≤1		
	0.4 <d< td=""><td>QTY=0</td><td></td><td></td></d<>	QTY=0		
LINE SCRATCHES	x≥0.7 y≥0.05	QTY=0	MINOR	3
BLACK LINE	x≥0.7 y≥0.05	QTY=0	MINOR	3

*d = MAX (d_1, d_2)

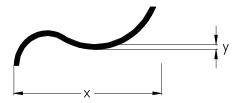
** N. A . = NOT APPLICABLE

DEFECT TABLE : B





POLARIZER BUBBLES / SPOTS fig . 2



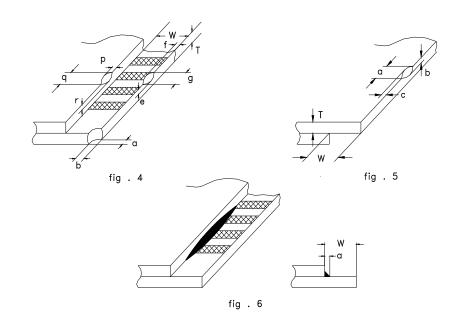
LINE SCRATCHES / BLACK LINE fig . 3

QUALITY STANDARD (CONT .)

DEFECT		CRITERIA	ТҮРЕ	FIGURE
	CONTACT EDGE	e≤1/2T f≤1/3W g≤3.5		4
CHIPS	BOTTOM GLASS	p≤1.0 q≤3.5 r≤1/2T	MINOR	4
	CORNER	a≤1.5 b≤W		4
	TOP GLASS	$a \le 3.0$ $b \le 1/3T$ $c \le 1/2W$		5
GLASS PROTRUSION		$a \le 1/4 W$	MINOR	6
RAINBOW		-	MINOR	-

UNLESS STATE OTHERWISE , ALL UNIT ARE IN MILLIMETER .

DEFECT TABLE : B



HANDLING PRECAUTIONS

(1) CAUTION OF LCD HANDLING & CLEANING

The polarizing plate on the surface of the panel is made from organic substances. Be very careful for chemicals not to touch the plate or it leads the polarizing plate to deteriorate.

If the use of a chemical is unavoidable, wipe the panel lightly with soft materials, such as gauze and absorbent cotton, soaked in a solvent.

*Usable solvent: Alcohol (ethanol, IPA and the like) *Appropriate solvent: Ketones, ethyl alcohol

Avoid wiping with a dry cloth, since it could damage the surface of the polarizing plate and others.

(2) CAUTION AGAINST STATIC CHARGE

The LCD modules use CMOS LSI drivers, so customers are recommended that any unused input terminal would be connected to V_{DD} or V_{SS} , do not input any signals before power is turned on, and ground your body, work/assembly areas, assembly equipment to protect against static electricity.

(3) ESD PRECAUTION

Inputs and outputs are protected against electrostatic discharge in normal handling. However, to be totally safe, it is

recommended to take normal precautions appropriate to handling LCM module. For example: product surface grounding.

Always take ESD precaution when handling the LCD Module. Components are exposed for direct finger touches and can

be damaged unless ESD precaution is taken.

(4) PACKAGING

Avoid intense shock and falls from a height and do not operate or store them exposed to direct sunshine or high temperature/humidity for long periods.

(5) CAUTION FOR OPERATION

The viewing angle can be adjusted by varying the LCD driving voltage VO.

Driving voltage should be kept within specified range, excess voltage shortens display life.

Response time increases with decrease in temperature.

Display may turn black or dark Blue at temperature above its operational range; this is however not destructive and the display will return to normal once the temperature falls back to range.

Mechanical disturbance during operation (such as pressing on the viewing area) may cause the segments to appear "fractured". They will recover once the display is turned off.

Condensation at terminals will cause malfunction and possible electrochemical reaction. Relative humidity of the environment should therefore be kept below 60%.

(6) SAFETY

Liquid crystal may leak out of a damaged LCD, it is recommended to wash off the liquid crystal by using solvents such as acetone or ethanol and should be burned up later.

If any liquid leak out of a damaged glass cell comes in contact with your hands, wash it off with soap and water immediately.

WARRANTY

CLOVER will replace or repair any of her LCD module in accordance with her LCD specification for a period of one year from date of shipment. The warranty liability of Clover is limited to repair and/or replacement. Clover will not be responsible for any subsequent or consequential event.