		CLOV	ER DISPLAY	Y LTD.
	L	CD MODULE Model : CG128	SPECIFICA	ΓION
			Revision	00
			Engineering Date Our Reference	Timothy 22 OCT 2021 9070
ADDRES TEL FAX	S: 1 st FL0 KOW : (852) 2 : (852) 2	OOR, EFFICIENCY HOUSI LOON, HONG KONG. 2341 3238 (SALES OFFICE 2357 4237 (SALES OFFICE	E, 35 TAI YAU STREET, S) (852) 2342 8228 (GEI)	SAN PO KONG, NERAL OFFICE)
E-MAIL URL	: <u>cdl@clc</u> : <u>http://w</u>	overdisplay.com ww.cloverdisplay.com		

MODE OF DISPLAY

Display mode

- STN : Yellow green Grey Blue (negative) FSTN positive
- FSTN negative

- Reflective type Transflective type
- Transmissive type
- Others

Display condition

- **Viewing direction**
- 6 O' clock
- □ 12 O' clock
- 3 O' clock
- 9 O' clock Γ

LCD MODULE NUMBER NOTATION:

*(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
*(4)Display mode
T - TN
V – TN (Negative)
S – STN Yellow green
G – STN Grey
B - STN Blue (Negative)
F - FSIN
N - FSIN (Negative)
P Poffective
K = Kenecuve E Transflactive
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	:	Serial
Driving method	:	1/65 duty, 1/9 bias
Controller IC	:	Sitronix ST7567 or equivalent For the detailed information, please refer to the IC specifications.

MECHANICAL DIMENSIONS

Item	Dimension	Unit	Item	Dimension	Unit
Outline Dimension					
No Backlight (N)	56.0(L)x38.5(W)x2.9(MAX)(H)	mm	Viewing Area	52.0(L)x26.5(W)	mm
LED Side Backlight(L)			Dot Pitch	0.38(L)x0.38(W)	mm
Yellow Green/White/Blue	61.0(L)x38.5(W)x7.0(MAX)(H)	mm	Dot Size	0.34(L)x0.34(W)	mm
Amber/Orange/Red	56.0(L)x38.5(W)x7.0(MAX)(H)	mm			

CONNECTOR PIN ASSIGNMENT

Pin No.	Symbol	Function	Pin No.	Symbol	Function			
1			16	NC	No Connection			
2			17	VSS	Ground(0V)			
3			18	VDD	Supply Voltage for Logic			
4	NG		19	D7(SI)	Serial Data Input			
5	NC	No Connection	20	D6(SCL)	Serial Clock Input			
6			21	A0	Data Control Signal			
7			22	RSTB	Hardware reset input pin			
8			23	CSB	Chip Select input pin			
9	VG	LCD driving voltage	24					
10			25		NG			
11	NC	No Connection	26	NC	No Connection			
12			27					
13	XV0	LCD driving voltage	*28	A	Supply Voltage for Backlight (+VE)			
14	V0	LCD driving voltage	*29	K	Supply Voltage for Backlight (-VE)			
15	NC	No Connection	_		_			

Note: (*) Pin 28,29 are used for backlight version.



CG12864E

COUNTER DRAWING OF MODULE DIMENSION





SPEC. REV.00

COUNTER DRAWING OF PIN OUT & BLOCK DIAGRAM

CG12864E

ELECTRICAL CHARACTERISTICS

ELECTRICAL CHARACTERIS	STICS		С	onditions: VSS=0V, Ta=25°C			
Item	Symbol	MIN.	TYP.	MAX.	Unit		
Supply Voltage for Logic	VDD	2.75	3.0	3.25	V		
Supply Current for Logic	IDD	_	0.25	0.4	mA		
Operating Voltage for LCD (*)	VLCD	11.4	12.0	12.6	V		
'High' Level Input Voltage	VIH	0.7VDD	_	VDD	V		
'Low' Level Input Voltage	VIL	VSS	_	0.3VDD	V		

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

Side-lite backlight:

Constant voltage driving:

Item	Symbol	MIN.	TYP.	MAX.	Unit	Condition
White BL current	I _{BL}	17	20	23	mA	$V_{BL} = 3.5V$
Blue BL current	I _{BL}	34	36	40	mA	$V_{BL} = 3.5V$
Yellow Green BL current	I _{BL}	34	36	40	mA	$V_{BL} = 3.5V$
Red BL current	I _{BL}	45	53	60	mA	$V_{BL} = 3.5V$
Amber BL current	I _{BL}	45	53	60	mA	$V_{BL} = 3.5V$
Orange BL current	I _{BL}	45	53	60	mA	$V_{BL} = 3.5V$

REFERENCE CIRCUIT EXAMPLE

Item	Value	Unit

ABSOLUTE MAXIMUM RATINGS

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

Item	Symbol	Rating (for normal temperature)	Rating (for wide temperature)	Unit
Supply Voltage	VDD	-0.3 to 3.6	-0.3 to 3.6	V
Operating Temperature	Topr	0 to 50	-20 to 70	°C
Storage Temperature	Tstg	-10 to 60	-30 to 80	°C

CG12864E

INSTRUCTIONS

	• •	R/W			С	DESCRIPTION					
	AU	(RWR)	D7	D6	D5	D4	D3	D2	D1	D0	DESCRIPTION
(1) Display ON/OFF	0	0	1	0	1	0	1	1	1	D	D=1, display ON D=0, display OFF
(2) Set Start Line	0	0	0	1	S5	S4	S3	S2	S1	S0	Set display start line
(3) Set Page Address	0	0	1	0	1	1	Y3	Y2	Y1	Y0	Set page address
(4)	0	0	0	0	0	1	X7	X6	X5	X4	Set column address (MSB)
Set Column Address	0	0	0	0	0	0	X3	X2	X1	X0	Set column address (LSB)
(5) Read Status	0	1	0	MX	D	RST	0	0	0	0	Read IC Status
(6) Write Data	1	0	D7	D6	D5	D4	D3	D2	D1	D0	Write display data to RAM
(7) Read Data	1	1	D7	D6	D5	D4	D3	D2	D1	D0	Read display data from RAM
(8) SEG Direction	0	0	1	0	1	0	0	0	0	MX	Set scan direction of SEG MX=1, reverse direction MX=0, normal direction
(9) Inverse Display	0	0	1	0	1	0	0	1	1	INV	INV =1, inverse display INV =0, normal display
(10) All Pixel ON	0	0	1	0	1	0	0	1	0	AP	AP=1, set all pixel ON AP=0, normal display
(11) Bias Select	0	0	1	0	1	0	0	0	1	BS	Select bias setting 0=1/9; 1=1/7 (at 1/65 duty)
(12) Read-modify-Write	0	0	1	1	1	0	0	0	0	0	Column address increment: Read:+0 , Write:+1
(13) END	0	0	1	1	1	0	1	1	1	0	Exit Read-modify-Write mode
(14) RESET	0	0	1	1	1	0	0	0	1	0	Software reset
(15) COM Direction	0	0	1	1	0	0	MY	-	-	-	Set output direction of COM MY=1, reverse direction MY=0, normal direction
(16) Power Control	0	0	0	0	1	0	1	VB	VR	VF	Control built-in power circuit ON/OFF
(17) Regulation Ratio	0	0	0	0	1	0	0	RR2	RR1	RR0	Select regulation resistor ratio
(40) 0 -+ 5)/	0	0	1	0	0	0	0	0	0	1	Double command!! Set
	0	0	0	0	EV5	EV4	EV3	EV2	EV1	EV0	electronic volume (EV) level
	0	0	1	1	1	1	1	0	0	0	Double command
(19) Set Booster	0	0	0	0	0	0	0	0	0	BL	Set booster level: BL=0: 4X BL=1: 5X
(20) Power Save	0	0			Co	mpound	Comm	and			Display OFF + All Pixel ON
(21) NOP	0	0	1	1	1	0	0	0	1	1	No operation
(22) Test	0	0	1	1	1	1	1	1	1	TE	Test Command Moe TE=0: releasing test command mode TE=1: entering test command mode

Note: Symbol "-"meansthis bit can be "H" or "L".

RECOMMENDED SETTINGS

LCD Bias Set : A2H ADC Select : A0H Common Output Mode Select : C8H V0 Voltage Regulator Internal Resistor Ratio Set : 27H Set the V0 output voltage:81H Electronic Volume Register Set : 2FH Power Control Set: 2FH Display Start Line Set : 40H Booster Ratio Set : F8H ,01H

DISPLAY DATA RAM (DDRAM)

ST7567 is built-in a RAM with 65X132 bit capacity which stores the display data. The display data RAM (DDRAM) store the dot data of the LCD. It is an addressable array with 132 columns by 65 rows (8-page with 8-bit and 1-page with 1-bit). The X-address is directly related to the column output number. Each pixel can be selected when the page and column addresses are specified (please refer to Fig 7 for detailed illustration). The rows are divided into: 8 pages (Page-0 ~ Page-7) each with 8 lines (for COM0~63) and Page-8 with only 1 line (COMS, for icon). The display data (D7~D0) corresponds to the LCD common-line direction and D0 is on top. All pages can be accessed through D[7:0] directly except icon page. Icon RAM uses only 1-bit of data bus (D0). Refer to Fig 8 for detailed illustration. The microprocessor can write to and read from (only Parallel interfaces) DDRAM by the I/O buffer. Since the LCD controller operates independently, data can be written into DDRAM at the same time as data is being displayed without causing the LCD flicker or data-conflict.

Line Address Circuit

The Line Address Circuit incorporates a counter and a Line Address register which is changed only by the "Display Start Line Set" instruction. This circuit assigns DDRAM a Line Address corresponding to the first display line (COM0). Therefore, by setting Line Address repeatedly, ST7567 can realize the screen scrolling without changing the contents of DDRAM as shown in Fig 10. The last common is always the COMS (common output for the icons). That means the icons will never scroll with the general display data.

Fig 10. Start Line Function

DISPLAY DATA RAM MAP

The relation between DDRAM and outputs with different MX or MY setting is shown below.

							c	olun	nn Address	(He	x)														
Р	age A	ddre	ss	Dete	00 00	8 8	06 05	8	MX=0	50	5F 5F	61 60	65 65 63							со	M Output	Мар			
D3	D2	D1	D0	Data	65 64 63	62 61	60 5F	50	MX=1	08	00	05 04 03	01 00				1/65 MY=0	Duty MY=1	1/49 MY=0	Duty MY=1	1/33 MY=0	Duty MY=1	1/55 MY=0	Duty MY=1	PAD No. (COM)
				D0										► 00H		H	COMO	COM63	COMO	COM47	СОМО	COM31	COMO	COM53	107
				D1						\vdash				► 01H			COM1	COM62	COM1	COM46	COM1	COM30 COM29	COM1	COM52	106
0	0	0	0	D3					Page 0					03H			COM3	COM60	COM3	COM44	COM3	COM28	COM3	COM50	100
ľ		0		D4					Fage 0	\square				04H			COM4	COM59	COM4	COM43	COM4	COM27	COM4	COM49	103
				D5 D6				+		H	++		++++	05H			COM6	COM57	COM5 COM6	COM42 COM41	COM5 COM6	COM26 COM25	COM5 COM6	COM48 COM47	102
				D7										07H			COM7	COM56	COM7	COM40	COM7	COM24	COM7	COM46	100
				D0				+		\vdash			+ + + -	08H 09H	1		COM8 COM9	COM55 COM54	COM8 COM9	COM39 COM38	COM8 COM9	COM23 COM22	COM8 COM9	COM45 COM44	99
				D2										0AH			COM10	COM53	COM10	COM37	COM10	COM21	COM10	COM43	97
0	0	0	1	D3					Page 1	\vdash				0BH	- 1		COM11	COM52	COM11	COM36	COM11	COM20	COM11	COM42	96
				D4						H	++			0CH 0DH			COM12 COM13	COM51 COM50	COM12 COM13	COM35 COM34	COM12 COM13	COM19 COM18	COM12 COM13	COM41 COM40	95
				D6						\square				0EH			COM14	COM49	COM14	COM33	COM14	COM17	COM14	COM39	93
				D7				++		+	++		+ + + -	10H			COM15 COM16	COM48 COM47	COM15 COM16	COM32 COM31	COM15	COM16	COM15 COM16	COM38 COM37	92
				D1										11H			COM17	COM46	COM17	COM30			COM17	COM36	90
				D2						\vdash				12H	-		COM18	COM45	COM18 COM19	COM29 COM28			COM18	COM35	89
0	0	1	0	D4					Page 2	H	++			14H			COM20	COM43	COM20	COM27			COM20	COM33	87
				D5						\square				15H			COM21	COM42	COM21	COM26			COM21	COM32	86
				D6				+		\vdash	++			10H	-		COM22 COM23	COM41 COM40	COM22 COM23	COM25 COM24			COM22 COM23	COM31 COM30	84
				DO										18H	Fi		COM24	COM39					COM24	COM29	83
				D1 D2						\vdash			+ + + -	19H 1AH	e A		COM25 COM26	COM38 COM37	-				COM25 COM26	COM28 COM27	82
0	0	1	1	D3					Page 3					1BH	ddr		COM27	COM36							80
ľ			'	D4					r age o	\vdash				1CH	sse		COM28	COM35	-						79
				D6				+		H				1EH	(He		COM20	COM33	고	꼬	고	ਸ਼	7	고	77
				D7										1FH	,×		COM31	COM32	esei	esei	esei	esei	esei	esei	76
				D0				-		\vdash			++++	20H 21H	Star		COM32 COM33	COM31 COM30	ved	ved	ved	Ved	Ved	ved	241
				D2										22H	Ē		COM34	COM29	-						243
0	1	0	0	D3		-		-	Page 4	\vdash				23H 24H	ne S		COM35	COM28 COM27	-						244
				D5						H				25H	6:		COM37	COM26					COM27	COM26	246
				D6						\square				26H	<u>]</u>		COM38	COM25					COM28	COM25	247
				D7							++			27H 28H	•		COM39 COM40	COM24 COM23	COM24	COM23			COM29 COM30	COM24 COM23	240
				D1										29H			C0M41	COM22	COM25	COM22			COM31	COM22	250
				D2 D3				+		\vdash	++		+ + + -	2AH 2BH			COM42 COM43	COM21 COM20	COM26 COM27	COM21 COM20			COM32 COM33	COM21 COM20	251
0	1	0	1	D4					Page 5					2CH			COM44	COM19	COM28	COM19			COM34	COM19	253
				D5				+		\mathbb{H}	+	++		2DH 2EH	+		COM45	COM18 COM17	COM29 COM30	COM18 COM17			COM35 COM36	COM18 COM17	254
				D7						H				2FH	1		CON147	COM16	COM31	COM16			COM37	COM16	256
				D0			++	+		H	+			30H			COM48	COM15	COM32	COM15	COM16	COM15	COM38	COM15	257
				D2			+++			H	+	++		32H	1		COMPO	COM13	COM34	COM13	COM18	COM13	COM40	COM13	259
0	1	1	0	D3					Page 6	F				33H			COM51	COM12	COM35	COM12	COM19	COM12	COM41	COM12	260
				D4	\vdash		$\left \right $	+	0	H	+			34H 35H	+		COM52 COM53	COM11 COM10	COM36 COM37	COM11 COM10	COM20 COM21	COM11 COM10	COM42 COM43	COM11 COM10	1 201
				D6						Þ				36H			COM54	COM9	COM38	COM9	COM22	COM9	COM44	COM9	2
<u> </u>				D7				+		\parallel	+	++	+++	37H 38H	+		COM55	COM8 COM7	COM39 COM40	COM8 COM7	COM23 COM24	COM8 COM7	COM45	COM8 COM7	3
				D1						H				39H			COM57	COM6	COM41	COM6	COM25	COM6	COM47	COM6	5
				D2				\square		H	\square			3AH			COM58	COM5	COM42	COM5	COM26	COM5	COM48	COM5	6
0	1	1	1	D3			+++	+	Page 7	H	+			3CH	+		COM60	COM3	COM44	COM3	COM28	COM4 COM3	COM50	COM4 COM3	8
				D5						Ц				3DH	1		COM61	COM2	COM45	COM2	COM29	COM2	COM51	COM2	9
				D6				+		H	+	++		3EH 3FH	+		COM62 COM63		COM46 COM47	COM1	COM30 COM31	COM1	COM52 COM53	COM1	10
1	0	0	0	D0					Page 8							•		00	10	CON (COM	S1, COMS	52)		000	12, 108
	1		<u> </u>	1	***				-			10 10 -			Jo.	í -									
					111	112	112	117		232	23,	23(23(236 236 240	(SEC	5)										

Fig 9. DDRAM and Output Map (COM/SEG)

SERIAL INTERFACE TIMING DIAGRAM

Item	Signal	Symbol	Condition	Min.	Max.	Unit
Serial clock period		tSCYC		100	—	
SCLK "H" pulse width	SCLK	tSHW		50		
SCLK "L" pulse width		tSLW		50	_	
Address setup time	A0	tSAS		30	_	
Address hold time		tSAH		20	_	ns
Data setup time	204	tSDS		30	_	
Data hold time	SDA	tSDH		20	_	
CSB-SCLK time	CSB -	tCSS		30	_	
CSB-SCLK time		tCSH		60	_	

*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 Vdd1 as the standard.

4-LINE SPI MODE DIAGRAM

RESET TIMING DIAGRAM

RESET TIMING

	CLOVER DISPLAY LTD.			CG	12864E
Item	Symbol	Condition	Min.	Max.	Unit
Reset time	tR		_	2.0	
Reset "L" pulse width	tRW		2.0		us

THE RESET CIRCUIT

Setting RSTB to "L" can initialize internal function. While RSTB is "L", no instruction except read status can be accepted. RSTB pin must connect to the reset pin of MPU and initialization by RSTB pin is essential before operating. Please note the hardware reset is not same as the software reset. When RSTB becomes "L", the hardware reset procedure will start. When RESET instruction is executed, the software reset procedure will start. The procedure is listed below:

Procedure	Hardware Reset	Software Reset
Display OFF: D=0, all SEGs/COMs output at VSS	V	Х
Normal Display: INV=0, AP=0	V	Х
SEG Normal Direction: MX=0	V	Х
Clear Serial Counter and Shift Register (if using Serial Interface)	V	Х
Bias Selection: BS=0	V	Х
Booster Level BL=0	V	X
Exit Power Saving Mode	V	Х
Power Control OFF: VB=0, VR=0, VF=0	V	Х
Exit Read-modify-Write mode	V	V
Start Line S[5:0]=0	V	V
Column Address X[7:0]=0	V	V
Page Address Y[3:0]=0	V	V
COM Normal Direction: MY=0	V	V
V0 Regulation Ratio RR[2:0]=(1,0,0)	V	V
EV[5:0]=(1,0,0,0,0,0)	V	V
Exit Test Mode: TE=0	V	V

After power-on, RAM data are undefined and the display status is "Display OFF". It's better to initialize whole DDRAM (ex: fill all 00h or write the display pattern) before turning the Display ON. Besides, the power is not stable at the time that the power is just turned ON. A hardware reset is needed to initialize those internal registers after the power is stable.

INITIALIZING WITHOUT THE BUILT-IN POWER SUPPLY CIRCUITS

- 1. Please refer to the timing specification of t_{RW} and t_R.
- 2. Refer to Section RESET CIRCUIT.
- 3. The 5ms requirement depends on the characteristics of LCD panel and the external component of the power circuit. It is recommended to check with the real products with external component.
- 4. The detailed instruction functionality is described in Section 9. INSTRUCTION DESCRIPTION;
- 5. Power stable is defined as the time that the later power (VDDI or VDDA) reaches 90% of its rated voltage.

ELECTRO-OPTICAL CHARACTERISTICS

MEASURING CONDITION: POWER SUPPLY = Vop / 64 Hz TEMPERATURE = 22 ± 5 °C RELATIVE HUMIDITY = 60 ± 15 %

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	
NO.	Item	FOR NORMAL TEMPERATURE	FOR WIDE TEMPERATURE	TIME
1	High temperature operating	50°C	70°C	240 hours
2	Low temperature operating	0°C	-20°C	240 hours
3	High temperature storage	60°C	80°C	240 hours
4	Low temperature storage	-10°C	-30°C	240 hours
5	Temperature-humidity storage	40°C 90% R.H.	60°C 90% R.H.	96 hours
6	Temperature cycling	-10°C to 60°C	-30°C to 80°C	5 avala
		30 Min Dwell	30 Min Dwell	5 cycle
7	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	

Inspection condition:

No. 1 ~ 6:

The samples should be placed in room temperature for 2 hours before inspection.

Acceptance criteria:

No non-conformance found in functional and cosmetic.

SAMPLING METHOD

SAMPLING PLAN:	ANSI/ASQ Z1.4	
CLASS OF AQL:	LEVEL II/ SING	LE SAMPLING
	MAJOR-0.65%	MINOR – 1.5%

QUALITY STANDARD

DEFECT	CRITER	IA	TYPE	FIGURE
SHORT CIRCUIT		-	MAJOR	-
MISSING SEGMENT			MAJOR	
UNEVEN / POOR CONTRAST		-	MAJOR	1
CROSS TALK		-1. 	MAJOR	-
PIN HOLE	$MAX(a,b) \leq$	1/3W	MINOR	1
	DOT MATRIX:			
	IF $0.6 \leq W$, M	AX(a,b) < 0.3 N.A.**		
	IF $0.4 \le W < 0.6$, M	IAX(a,b) < 0.25 N.A.**		
	IF $W < 0.4$, M	IAX(a,b) < 0.2 N.A.**		
EXCESS SEGMENT	$MAX(c,d) \leq$	1/3T	MINOR	1
BUBBLES	d* ≥ 0.7	QTY=0	MINOR	2
SPOTS	$d \le 0.7$	N.A.**	MINOR	2
	0.7 <d≤0.8< td=""><td>QTY≤2</td><td></td><td></td></d≤0.8<>	QTY≤2		
	0.8 <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 : F

LINE SCRATCHES / BLACK LINE fig . 3

QUALITY STANDARD (CONT .)

	DEFECT	CRITERIA	TYPE	FIGURE
	CONTACT EDGE	e≤T f≤1/2W g:N.A.	2012/02/02 00	4
CHIPS	BOTTOM GLASS	p≤V.A.*** q:N.A. r≤T	MINOR	4
	CORNER	a:N.A. b≤W		4
	TOP GLASS	a:N.A. b≤T c≤W	5	5
GLASS P	ROTRUSION	$a \le 1/3 W$	MINOR	6
RAINBOW		-	MINOR	-
UNLESS STAT	E OTHERWISE ALL UNIT ARE IN	DEFECT	TABLE :F	

HANDLING PRECAUTIONS

(1) CAUTION OF LCD HANDLING & CLEANING

Use soft cloth with solvent (recommended below) to clean the display surface and wipe lightly.

- Isopropyl alcohol, ethyl alcohol, trichlorotriflorothane

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

(2) CAUTION AGAINST STATIC CHARGE

The LCD modules use CMOS LSI drivers, so customers are recommend 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.

Remove the protective film slowly and, if possible, under ESD control device like ion blower and humidity of working room should be kept over 50%RH to reduce risk of static charge.

(3) PACKAGING

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

(4) CAUTION FOR OPERATION

It is an indispensable condition to drive LCD's within the specified voltage limit since the higher voltage than the limit causes the shorter LCD life. The use of direct current drive should be avoided because an electrochemical reaction due to direct current causes LCD's undesirable deterioration.

Response time will be extremely delayed at low temperature, and LCD's show dark color at high temperature. However those phenomena do not mean malfunction or out of order with LCD's.

Some font will be abnormally displayed when the display area is pushed hard during operation. But it resumes normal condition after turning off once.

(5) SOLDERING (for Pin type)

It is recommended to complete dip soldering at 270 °C or hand soldering at 280 °C within 3 seconds. The soldering position is at least 3mm apart from the pin head. Wave or reflow soldering are not recommended. Metal pins should not be soldered for more than 3 times and each soldering should be done after cool down of metal pins

(6) SAFETY

For crash damaged or unnecessary LCD's, it is recommended to wash off liquid crystal by either of solvents such as acetone and ethanol and should be burned up later.

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

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.

For Internal Use Only

SPECIFICATION REVISION RECORD

Revision No.	Description	Date(DD/MM/YY)
00	1 st Issue	18/10/21