



SPECIFICATIONS

CUSTOMER	:	CCN612
SAMPLE CODE	:	PS12864LRF-028-H-Q
MASS PRODUCTION CODE	:	PE12864LRF-028-H-Q
SAMPLE VERSION	:	01
SPECIFICATIONS EDITION	:	004
DRAWING NO. (Ver.)	:	JLMD- PE12864LRF-028-H-Q _002
PACKAGING NO. (Ver.)	:	PKG-PE12864LRF-028-H-Q_002

Customer Approved

Date:



Approved	Checked	Designer
閔偉	張久慧	劉進

- Preliminary specification for design input
- Specification for sample approval

POWERTIP TECH. CORP.

Headquarters:
 No.8, 6th Road, Taichung Industrial Park,
 Taichung, Taiwan
 台中市 407 工業區六路 8 號

TEL: 886-4-2355-8168
 FAX: 886-4-2355-8166

E-mail: sales@powertip.com.tw
 Http://www.powertip.com.tw



RECORDS OF REVISION

Date (mm / dd / yyyy)	Ver.	Edi.	Description	Page	Design by
01/09/2007	01	001	Mass Production.	-	Louis
11/26/2007	01	002	Add notes..	-	Ackey
05/27/2009	01	003	Add FPC description in LCM drawing	Appendix	Austin
08/09/2012	01	004	Change Packaging	Appendix	劉進

Total:25 Page



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1. SPECIFICATIONS

1.1 Features

Item	Standard Value
Display Type	128 * 64 Dots
LCD Type	FSTN, Positive, Transflective
Driver Condition	LCD Module: 1/65 Duty, 1/9 Bias
Viewing Direction	6 O'clock
Backlight	LED B/L
Weight	32 g
Interface	Serial Peripheral Interface
Controller IC	Solomon SSD1805Z
ROHS	THIS PRODUCT CONFORMS THE ROHS OF PTC Detail information please refer web side : http://www.powertip.com.tw/news.php?area_id_view=1085560481/

1.2 Mechanical Specifications

Item	Standard Value	Unit
Outline Dimension	74.5 (L) * 57.2 (w) * 9.32(H)	mm
Viewing Area	63.0 (L) * 40.0 (w)	mm
Active Area	57.57 (L) * 34.12 (w)	mm
Dot Size	0.42 (L) * 0.42 (w)	mm
Dot Pitch	0.45 (L) * 0.45 (w)	mm

Note : For detailed information please refer to LCM drawing

1.3 Absolute Maximum Ratings

Item	Symbol	Condition	Min.	Max.	Unit
Power Supply Voltage	$V_{DD}-V_{SS}$	—	-0.3	+4.0	V
LCD Driver Supply Voltage	V_{op}	—	0	+15.0	V
Input Voltage	V_{IN}	—	VSS-0.3	4.0	V
Operating Temperature	T_{OP}	—	-5	50	°C
Storage Temperature.	T_{ST}	—	-20	70	°C
Storage Humidity	H_D	$T_a < 40\text{ °C}$	20	90	%RH

1.4 DC Electrical Characteristics

$V_{DD} = 3.3V \pm 0.3V$, $V_{SS} = 0V$, $T_a = 25^\circ C$

Item	Symbol	Condition	Min.	Typ.	Max.	Unit
Logic Supply Voltage	V_{DD}	-	3.0	3.3	3.6	V
“H” Input Voltage	V_{IH}	-	$0.8 V_{DD}$	-	V_{DD}	V
“L” Input Voltage	V_{IL}	-	0	-	$0.2 V_{DD}$	V
“H” Output Voltage	V_{OH}	$I_{VOUT} = -100\mu A$	$0.9 V_{DD}$	-	V_{DD}	V
“L” Output Voltage	V_{OL}	$I_{VOUT} = 100\mu A$	0	-	$0.1 V_{DD}$	V
Supply Current	I_{DD}	$V_{DD} = 3.3 V; V_{OP} = 9.1 V;$ Pattern= Full display	-	0.5	-	mA
		$V_{DD} = 3.3 V; V_{OP} = 9.1 V;$ Pattern= Horizontal line*1	-	1.5	5	
LCM Driver Voltage	V_{op}	$-5^\circ C$	9.2	9.4	9.6	V
		$25^\circ C$ *2	8.9	9.1	9.3	
		$50^\circ C$	8.7	8.9	9.1	

NOTE: *1 The Maximum current display;

*2 The V_{OP} test point is $V_{OUT} - V_{SS}$.



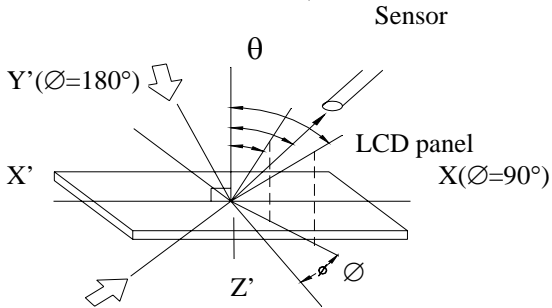
1.5 Optical Characteristics

LCD Panel: 1/65 Duty, 1/9 Bias, $V_{OP} = 9.38 \text{ V}$, $T_a = 25^\circ\text{C}$

Item	Symbol	Conditions	Min.	Typ.	Max.	Reference
View Angle	θ	$C \geq 2.0, \varnothing = 0^\circ$	-40°	-	40°	Notes 1 & 2
Contrast Ratio	CR	$\theta = 5^\circ, \varnothing = 0^\circ$	2	4	-	Note 3
Response Time(rise)	Tr	$\theta = 5^\circ, \varnothing = 0^\circ$	-	100 ms	150 ms	Note 4
Response Time(fall)	Tf	$\theta = 5^\circ, \varnothing = 0^\circ$	-	200 ms	300 ms	

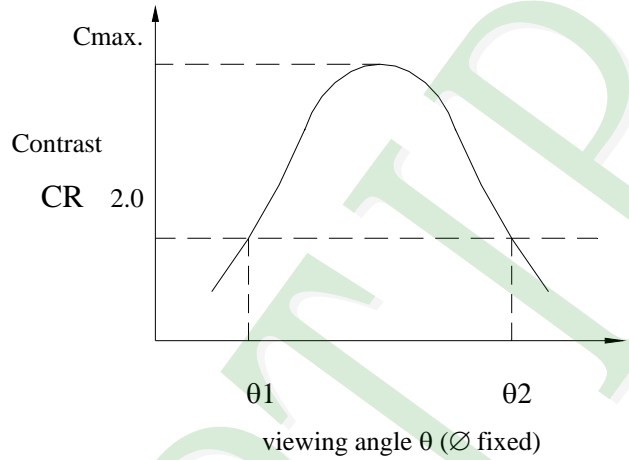
Note 1: Definition of angles θ and \varnothing

Light (when reflected) $z (\theta=0^\circ)$



Light (when transmitted) $Y (\varnothing=0^\circ)$
 $(\theta=90^\circ)$

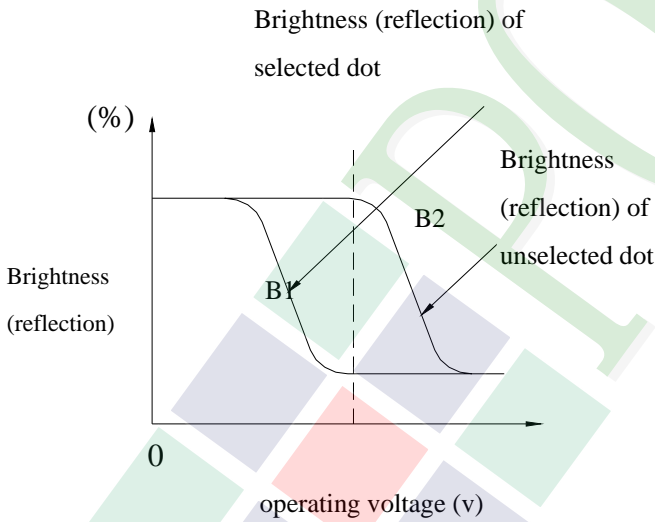
Note 2: Definition of viewing angles θ_1 and θ_2



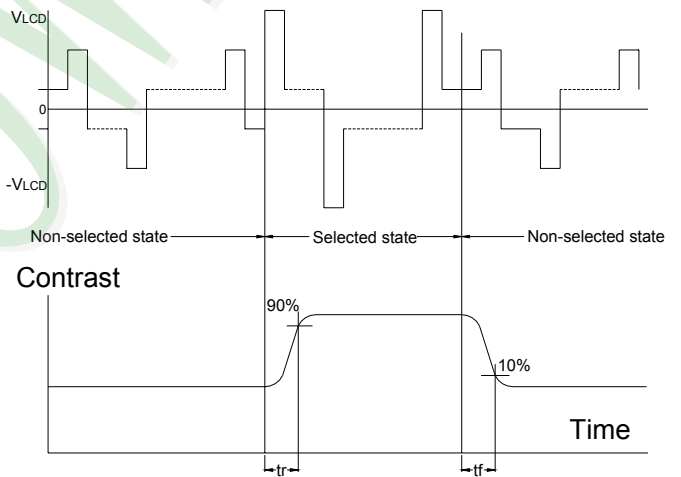
Note : Optimum viewing angle with the naked eye and viewing angle θ at C_{max} . Above are not always the same

Note 3: Definition of contrast C

$$C = \frac{\text{Brightness (reflection) of unselected dot (B2)}}{\text{Brightness (reflection) of selected dot (B1)}}$$



Note 4: Definition of response time



Note: Measured with a transmissive LCD panel which is displayed 1 cm²

V_{LCD} : Operating voltage f_{FRM} : Frame frequency
 t_r : Response time (rise) t_f : Response time (fall)

1.6 Backlight Characteristics

LCD Module with LED

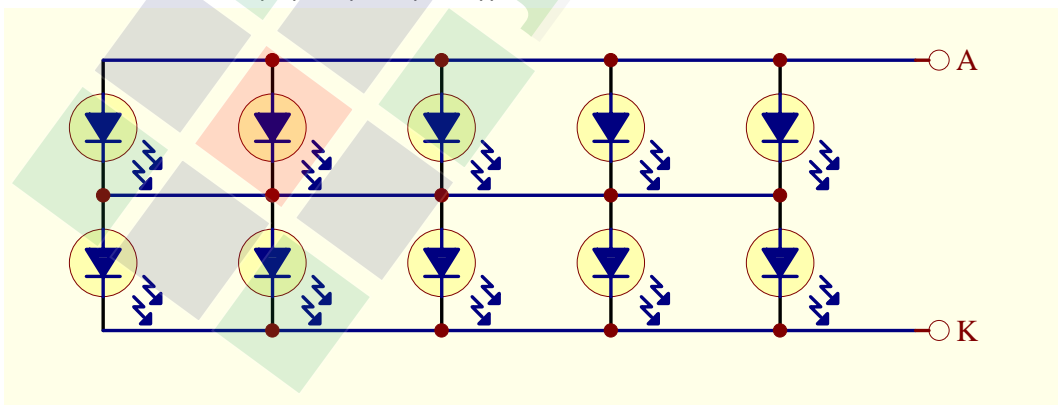
Maximum Ratings

Item	Symbol	Conditions	Min.	Max.	Unit
Forward Current	I_F	$T_a = 25^\circ\text{C}$	-	100	mA
Reverse Voltage	V_R	$T_a = 25^\circ\text{C}$	-	5	V
Power Dissipation	PD	$T_a = 25^\circ\text{C}$	-	0.5	W

Electrical / Optical Characteristics

$T_a = 25^\circ\text{C}$						
Item	Symbol	Conditions	Min.	Typ.	Max.	Unit
Forward Voltage	V_F	$I_F = 50\text{ mA}$	-	3.9	4.2	V
Reverse Current	I_R	$V_R = 3.0\text{ V}$	-	-	10	μA
Average Brightness	I_V	$I_F = 50\text{ mA}$	10	15	-	cd/m^2
Average Brightness (with LCD)	I_V	$I_F = 50\text{ mA}$	1	2	-	cd/m^2
Wavelength (With LCD)	Hue	$I_F = 50\text{ mA}$	578	583	588	nm
Uniformity *1	ΔB	$I_F = 50\text{ mA}$	70	-	-	%
Color	Yellow-Green					

*1 : $\Delta B = (B(\text{min}) / B(\text{max})) * 100\%$



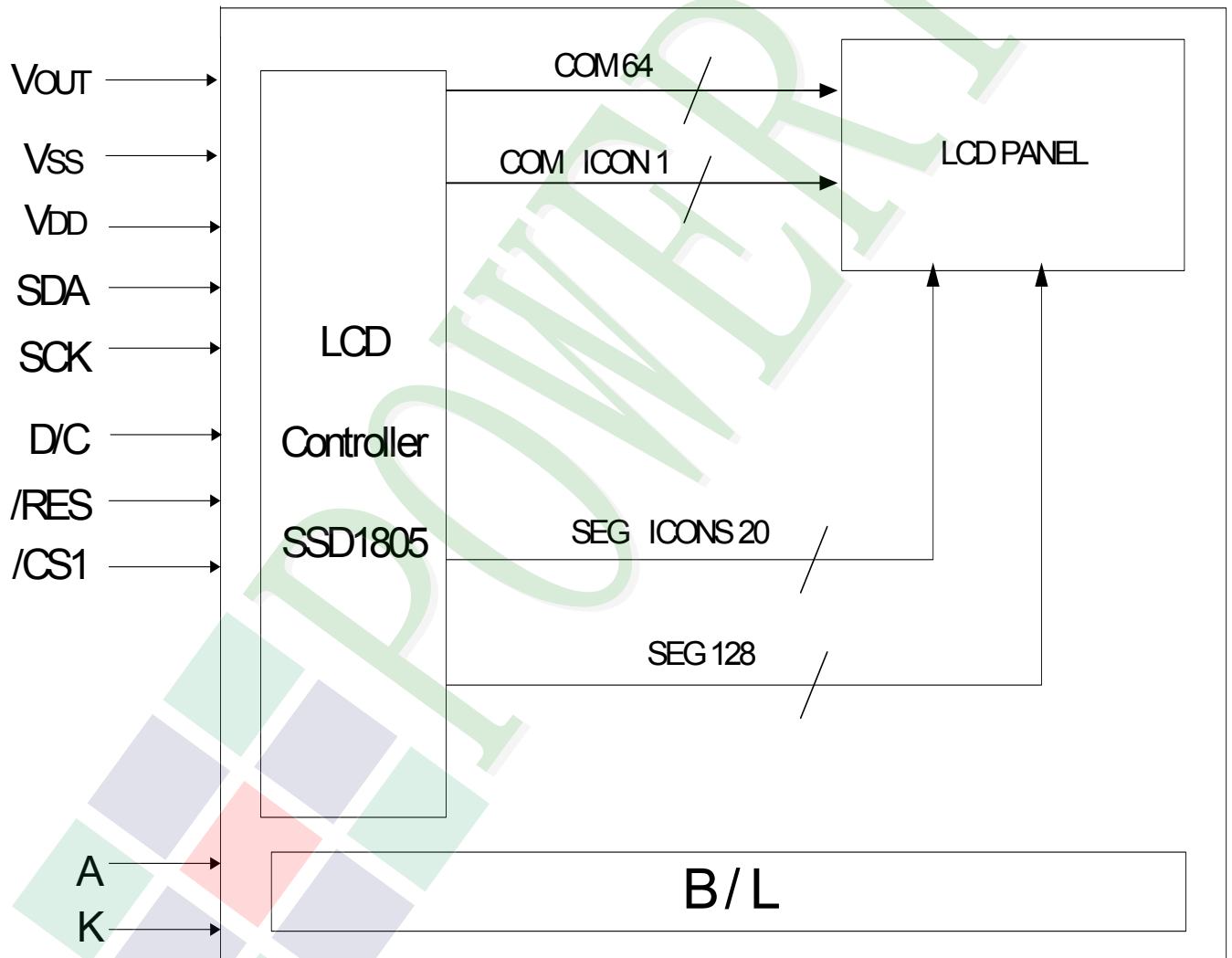
2. MODULE STRUCTURE

2.1 Counter Drawing

2.1.1 LCM Mechanical Diagram

* See Appendix

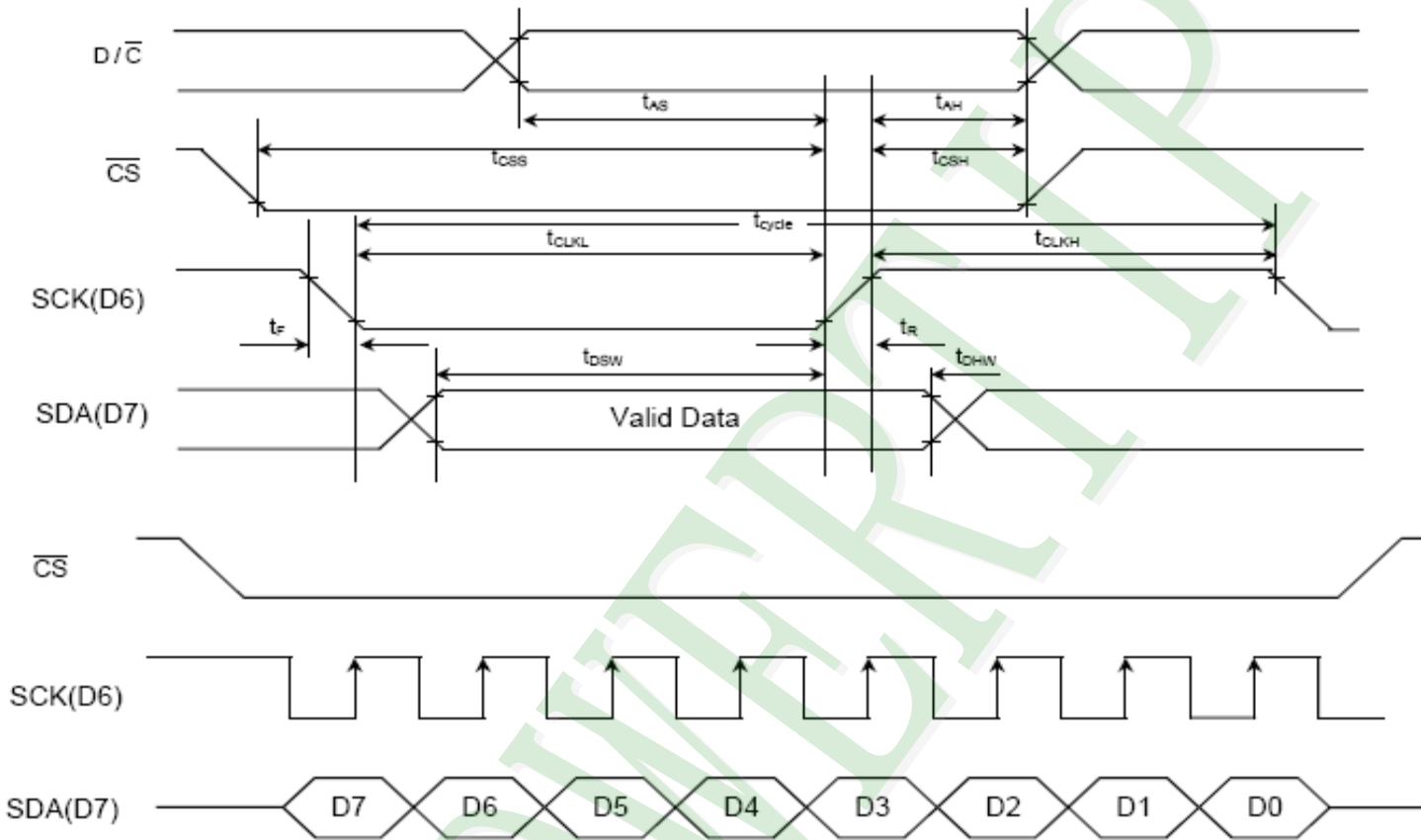
2.1.2 Block Diagram



2.2 Interface Pin Description

Pin No.	Symbol	Function
1	A	Power supply for LED backlight anode input.
2	K	Power supply for LED backlight cathode input .
3	V _{OUT}	This is the most positive voltage supply pin of the chip. It can be supplied externally or generated by the internal DC-DC converter. If the internal DC-DC converter generates the voltage level at V _{OUT} , the voltage level is used for internal referencing only. The voltage level at V _{OUT} pin is not used for driving external circuitry.
4	V _{SS}	The V _{SS} is the ground reference of the system.
5	V _{SS}	The V _{SS} is the ground reference of the system.
6	V _{DD}	This pin is the system power supply pin of the logic block.
7	SDA	serial data input (D7).
8	SCK	serial clock input (D6).
9	D/C	This pin is Data/Command control pin. When the pin is pulled high, the data at D7 - D0 is treated as display data. When the pin is pulled low, the data at D7 - D0 will be transferred to the command register.
10	/RES	This pin is the reset signal input. Initialization of the chip is started once this pin is pulled low. Minimum pulse width for reset sequence is 20us.
11	/CS1	These pins are the chip select inputs. The chip is enabled for MCU communication only when both CS 1 is pulled low and CS2 is pulled high.

2.3 Timing Characteristics



$$V_{DD} = 3.3V \pm 0.3V, V_{SS} = 0V, T_a = 25^\circ C$$

Symbol	Parameter	Min	Typ	Max	Unit
t_{cycle}	Clock Cycle Time	58.8	-	-	ns
t_{AS}	Address Setup Time	10	-	-	ns
t_{AH}	Address Hold Time	5	-	-	ns
t_{DSW}	Write Data Setup Time	30	-	-	ns
t_{DHW}	Write Data Hold Time	30	-	-	ns
T_{CLKL}	Clock Low Time	29.4	-	-	ns
T_{CLKH}	Clock High Time	29.4	-	-	ns
t_{CSS}	Chip Select Setup Time (for D7 input)	30	-	-	ns
t_{CSH}	Chip Select Hold Time (for D0 input)	29.4	-	-	ns
t_R	Rise Time	-	-	10	ns
t_F	Fall Time	-	-	10	ns

2.4 Display Command

Command Table (D/C = 0, R/W (WR) = 0, E=1(RD = 1) unless specific setting is stated)

D/C	Hex	D7	D6	D5	D4	D3	D2	D1	D0	Command	Description
0	00 – 0F	0	0	0	0	X ₃	X ₂	X ₁	X ₀	Set Lower Column Address	Set the lower nibble of the column address register using X ₃ X ₂ X ₁ X ₀ as data bits. The lower nibble of column address is reset to 0000b after POR.
0	10 – 1F	0	0	0	1	X ₃	X ₂	X ₁	X ₀	Set Higher Column Address	Set the higher nibble of the column address register using X ₃ X ₂ X ₁ X ₀ as data bits. The higher nibble of column address is reset to 0000b after POR.
0	20 – 27	0	0	1	0	0	X ₂	X ₁	X ₀	Set Internal Gain Resistor Ratio	Feedback gain of the internal regulated DC-DC converter for generating V _{OUT} increases as X ₂ X ₁ X ₀ increased from 000b to 111b. After POR, X ₂ X ₁ X ₀ = 100b.
0	28 – 2F	0	0	1	0	1	X ₂	1	X ₀	Set Power Control Register	X ₀ =0: turns off the output op-amp buffer (POR) X ₀ =1: turns on the output op-amp buffer X ₂ =0: turns off the internal voltage booster (POR) X ₂ =1: turns on the internal voltage booster
0 0	40 – 7F	0 *	1 Y ₆	X ₅ Y ₅	X ₄ Y ₄	X ₃ Y ₃	X ₂ Y ₂	X ₁ Y ₁	X ₀ Y ₀	Set Display Start Line	For 68 MUX mode, set X ₅ X ₄ X ₃ X ₂ X ₁ X ₀ = 111111 and set the GDDRAM display start line register from 0-67 using Y ₆ Y ₅ Y ₄ Y ₃ Y ₂ Y ₁ Y ₀ For 64/54/32 MUX modes, set GDDRAM display start line register from 0-63 using X ₅ X ₄ X ₃ X ₂ X ₁ X ₀ . There is no need to send the Y ₆ Y ₅ Y ₄ Y ₃ Y ₂ Y ₁ Y ₀ parameters. Display start line register is reset to 000000 after POR for all MUX modes.
0	84 – 87	1	0	0	0	0	1	X ₁	X ₀	Set Boost Level	Set the DC-DC multiplying factor from 2X to 5X. X ₁ X ₀ : 00: 3X 01: 4X 10: 5X 11: 2X Remarks: The POR default boosting level is determined by hardware selection pin, B0 & B1.
0 0	81	1 0	0 0	0 X ₅	0 X ₄	0 X ₃	0 X ₂	0 X ₁	1 X ₀	Set Contrast Control Register	Select contrast level from 64 contrast steps. Contrast increases (V _{OUT} decreases) as X ₅ X ₄ X ₃ X ₂ X ₁ X ₀ is increased from 000000b to 111111b. X ₅ X ₄ X ₃ X ₂ X ₁ X ₀ = 100000b after POR
0	A0 – A1	1	0	1	0	0	0	0	X ₀	Set Segment Re-map	X ₀ =0: column address 00h is mapped to SEG0 (POR) X ₀ =1: column address 83h is mapped to SEG0 Refer to Table 5 on page 16 for example.
0	A2 – A3	1	0	1	0	0	0	1	X ₀	Set LCD Bias	X ₀ =0: POR default bias: 32 MUX mode = 1/8 54 MUX mode = 1/8 64 MUX mode = 1/9 68 MUX mode = 1/9 X ₀ =1: alternate bias: 32 MUX mode = 1/6 54 MUX mode = 1/6 64 MUX mode = 1/7 68 MUX mode = 1/7 For other bias ratio settings, see "Set 1/4 Bias Ratio" and "Set Bias Ratio" in Extended Command Set.
0	A4 – A5	1	0	1	0	0	1	0	X ₀	Set Entire Display On/Off	X ₀ =0: normal display (POR) X ₀ =1: entire display on
0	A6 – A7	1	0	1	0	0	1	1	X ₀	Set Normal/Reverse Display	X ₀ =0: normal display (POR) X ₀ =1: reverse display



D/C	Hex	D7	D6	D5	D4	D3	D2	D1	D0	Command	Description
0	AE – AF	1	0	1	0	1	1	1	X ₀	Set Display On/Off	X ₀ =0: turns off LCD panel (POR) X ₀ =1: turns on LCD panel
0	B0 – B8	1	0	1	1	X ₃	X ₂	X ₁	X ₀	Set Page Address	Set GDDRAM Page Address (0-8) for read/write using X ₃ X ₂ X ₁ X ₀
0	C0 – C8	1	1	0	0	X ₃	*	*	*	Set COM Output Scan Direction	X ₃ =0: normal mode (POR) X ₃ =1: remapped mode, COM0 to COM [N-1] becomes COM [N-1] to COM0 when Multiplex ratio is equal to N. See Table 5 on page 16 for detail mapping.
0	E0	1	1	1	0	0	0	0	0	Set Read-Modify-Write Mode	Read-Modify-Write mode will be entered in which the column address will not be increased during display data read. After POR, Read-modify-write mode is turned OFF.
0	E2	1	1	1	0	0	0	1	0	Software Reset	Initialize internal status registers.
0	EE	1	1	1	0	1	1	1	0	Set End of Read-Modify-Write Mode	Exit Read-Modify-Write mode. RAM Column address before entering the mode will be restored. After POR, Read-modify-write mode is OFF.
0 0	AC – AD	1 *	0 *	1 *	0 *	1 *	1 *	0 Y ₁	X ₀ Y ₀	Indicator Display Mode	X ₀ = 0: indicator off (POR, second command byte is not required) X ₀ = 1: indicator on (second command byte required) Y ₁ Y ₀ = 00: indicator off Y ₁ Y ₀ = 01: indicator on and blinking at ~1 second interval Y ₁ Y ₀ = 10: indicator on and blinking at ~1/2 second interval Y ₁ Y ₀ = 11: indicator on constantly This second byte command is required ONLY when "Set Indicator On" command is sent.
0	E3	1	1	1	0	0	0	1	1	NOP	Command result in No Operation.
0	F0 – FF	1	1	1	1	*	*	*	*	Set Test Mode	Reserved for IC testing. Do NOT use.
0 0 0 0	AE A5	1 1 1 *	0 0 0 *	1 1 1 *	0 0 0 *	1 0 1 *	1 1 1 *	1 0 0 X ₁	0 1 X ₀ X ₀	Set Power Save Mode	Either standby or sleep mode will be entered using compound commands. Issue compound commands "Set Display Off" followed by "Set Entire Display On". Standby mode will be entered when the static indicator is on constantly. Sleep mode will be entered when static indicator is off.

Extended Command Table(D/C = 0,R/W (WR) = 0,E=1(RD = 1) unless specific setting is stated)

D/C	Hex	D7	D6	D5	D4	D3	D2	D1	D0	Command	Description
0 0	82	1 *	0 0	0 0	0 0	0 X ₃	0 X ₂	1 X ₁	0 X ₀	OTP Setting	X ₃ X ₂ X ₁ X ₀ : OTP fuse value 0000 : original contrast 0001 : original contrast + 1 steps 0010 : original contrast + 2 steps 0011 : original contrast + 3 steps 0100 : original contrast + 4 steps 0101 : original contrast + 5 steps 0110 : original contrast + 6 steps 0111 : original contrast + 7 steps 1000 : original contrast - 8 steps 1001 : original contrast - 7 steps 1010 : original contrast - 6 steps 1011 : original contrast - 5 steps 1100 : original contrast - 4 steps 1101 : original contrast - 3 steps 1110 : original contrast - 2 steps 1111 : original contrast - 1 steps
0	83	1	0	0	0	0	0	1	1	OTP Programming	This command starts to program LCD driver with OTP offset value. Each bit can be programmed to 1 once. Detail of OTP programming procedure on page 31
0 0	A8	1 0	0 X ₆	1 X ₅	0 X ₄	1 X ₃	0 X ₂	0 X ₁	0 X ₀	Set Multiplex Ratio	To select multiplex ratio N from 2 to the maximum multiplex ratio (POR value) for each member (including icon line for 65 MUX mode). Max. MUX ratio: 68 MUX: 68 N = X ₆ X ₅ X ₄ X ₃ X ₂ X ₁ X ₀ + 1 + ICON*, (*ICON exist for 64/54/32 MUX mode) e.g. N = 001111b + 2 = 17
0 0	A9	1 X ₇	0 X ₆	1 X ₅	0 X ₄	1 X ₃	0 X ₂	0 X ₁	1 X ₀	Set Bias Ratio Set TC Value Modify Osc. Freq.	MUX X ₁ X ₀ = 00 01 10 11 32 : 1/8 or 1/6(POR) 1/6 or 1/5 1/9 or 1/7 P 54 : 1/8 or 1/6(POR) 1/6 or 1/5 1/9 or 1/7 P 64 : 1/8 or 1/6 1/6 or 1/5 1/9 or 1/7(POR) P 68 : 1/8 or 1/6 1/6 or 1/5 1/9 or 1/7(POR) P P stands for prohibited settings X ₄ X ₃ X ₂ = 000: (TC0) Typ. -0.05 (POR) X ₄ X ₃ X ₂ = 010: (TC2) Typ. -0.15 X ₄ X ₃ X ₂ = 100: (TC4) Typ. -0.20 X ₄ X ₃ X ₂ = 111: (TC7) Typ. -0.25 Increase the value of X ₇ X ₆ X ₅ will increase the oscillator frequency and vice versa. Default Mode: X ₇ X ₆ X ₅ Osc Frequency (Hz) 000 61 001 64 010 68 011 72 (POR) 100 75 101 80 110 90 111 98 Remarks: By software program the multiplex ratio, the typical oscillator frequency is listed above.
0	AA - AB	1	0	1	0	1	0	1	X ₀	Set ¼ Bias Ratio	X ₀ = 0: use normal setting (POR) X ₀ = 1: fixed at 1/4 bias regardless of other bias setting commands

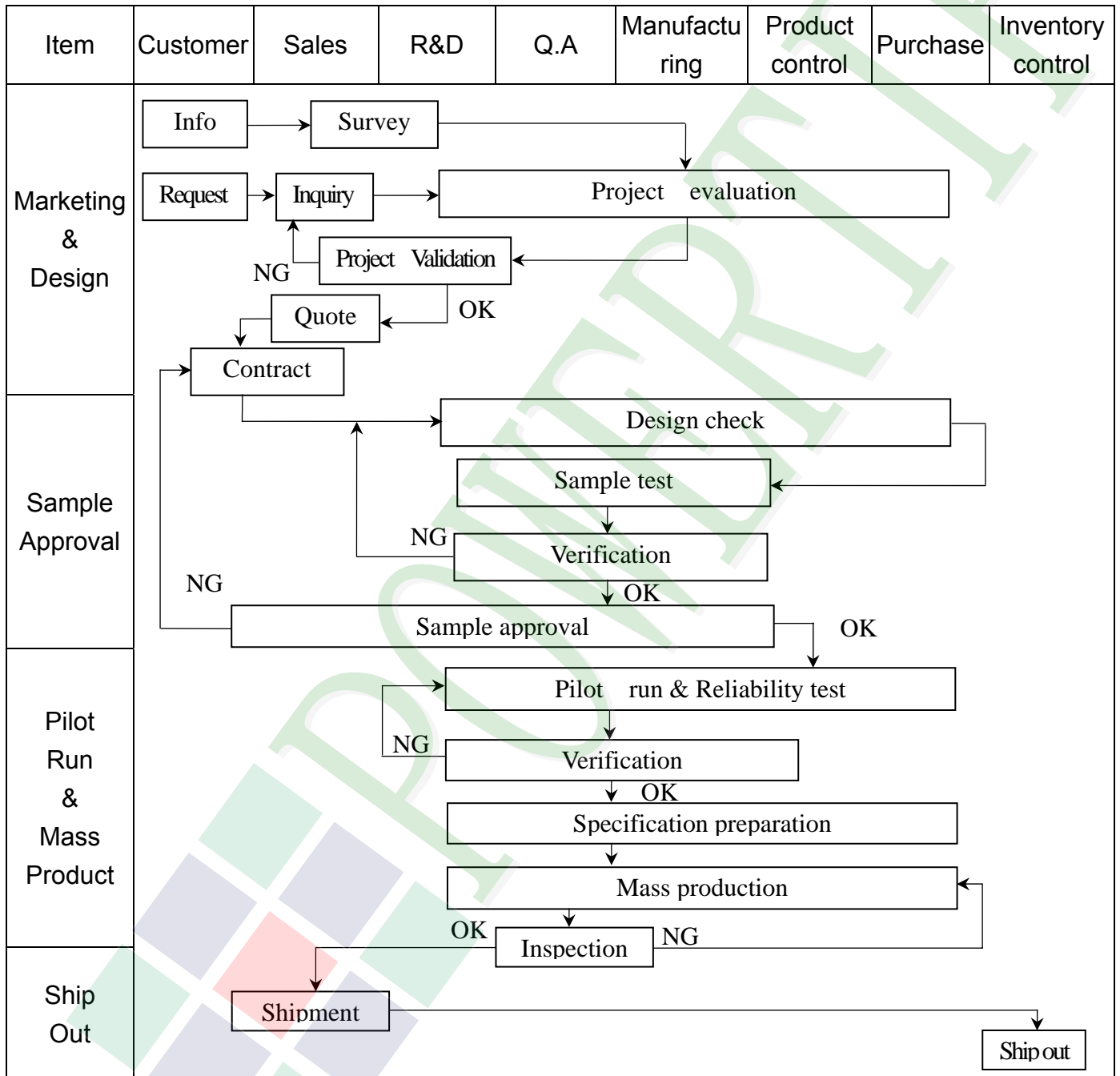
D/C	Hex	D7	D6	D5	D4	D3	D2	D1	D0	Command	Description
0	D0 - D1	1	1	0	1	0	0	0	X ₀	Set icon enabled	X ₀ = 0: icon is off. X ₀ = 1: icon is on. (POR)
0 0	D3	1 0	1 X ₅	0 X ₅	1 X ₄	0 X ₃	0 X ₂	1 X ₁	1 X ₀	Set Display Offset Set Total Frame Phases	After POR, X ₆ X ₅ X ₄ X ₃ X ₂ X ₁ X ₀ = 0 After setting MUX ratio less than default value, data will be displayed at the beginning/towards the end of display matrix. To move display towards Row 0 by L, X ₆ X ₅ X ₄ X ₃ X ₂ X ₁ X ₀ = L = L To move display away from Row 0 by L, X ₆ X ₅ X ₄ X ₃ X ₂ X ₁ X ₀ = Y-L Note: max. value of L = POR default MUX ratio – display MUX Note: Y represents POR default MUX ratio The On/Off of the Static Icon is given by 3 phases / 1 phase overlapping of the M and MSTAT signals. This command set total phases of the M/MSTAT signals for each frame. The more the total phases, the less the overlapping time and thus the lower the effective driving voltage. X ₅ X ₄ = 00: 5 phases X ₅ X ₄ = 01: 7 phases X ₅ X ₄ = 10: 9 phases (POR) X ₅ X ₄ = 11: 16 phases
0 0	D4	1 0	1 0	0 X ₅	1 X ₄	0 0	1 0	0 0	0 0	Set Display Offset	After POR, X ₆ X ₅ X ₄ X ₃ X ₂ X ₁ X ₀ = 0 After setting MUX ratio less than default value, data will be displayed at the beginning/towards the end of display matrix. To move display towards Row 0 by L, X ₆ X ₅ X ₄ X ₃ X ₂ X ₁ X ₀ = L = L To move display away from Row 0 by L, X ₆ X ₅ X ₄ X ₃ X ₂ X ₁ X ₀ = Y-L Note: max. value of L = POR default MUX ratio – display MUX Note: Y represents POR default MUX ratio

Read Command Table (D/C = 1, R/W (WR) = 1, E=1(RD = 0) unless specific setting is stated)

D/C	Hex	D7	D6	D5	D4	D3	D2	D1	D0	Command	Description
1	00 - FF	X ₇	X ₆	X ₅	0	X ₃	X ₂	X ₁	X ₀	Status Register Read	X ₇ =0: indicates the driver is ready for command. X ₇ =1: indicates the driver is Busy. X ₆ =0: indicates normal segment mapping with column address. X ₆ =1: indicates reverse segment mapping with column address. X ₅ =0: indicates the display is ON. X ₅ =1: indicates the display is OFF. X ₃ X ₂ X ₁ X ₀ = 0010, the 4-bit is fixed to 0010 which could be used to identify as Solomon Systech Device.

3. QUALITY ASSURANCE SYSTEM

3.1 Quality Assurance Flow Chart





Item	Customer	Sales	R&D	Q.A	Manufacturing	Product control	Purchase	Inventory control
Sales Service	<pre> graph TD Info[Info] --> Claim[Claim] Claim --> FA[Failure analysis] Claim --> AR[Analysis report] FA --> CA[Corrective action] CA --> Tracking[Tracking] </pre>							
Q.A Activity	1. ISO 9001 Maintenance Activities 3. Equipment calibration 5. Standardization Management				2. Process improvement proposal 4. Education And Training Activities			

3.2. Inspection Specification

◆ Scope : The document shall be applied to LCD Module for Monotype and Color STN(Ver. B01).

◆ Inspection Standard : MIL-STD-105E Table Normal Inspection Single Sampling Level II .

◆ Equipment : Gauge 、 MIL-STD 、 Powertip Tester 、 Sample

◆ Defect Level : Major Defect AQL : 0.4 ; Minor Defect : AQL : 1.5 .

◆ OUT Going Defect Level : Sampling .

◆ Manner of appearance test :

- (1). The test be under 20W×2 fluorescent light ' and distance of view must be at 30 cm.
- (2). Standard of inspection : (Unit : mm)
- (3). The test direction is base on about around 45° of vertical line. (Fig. 1)
- (4). Definition of area . (Fig. 2)

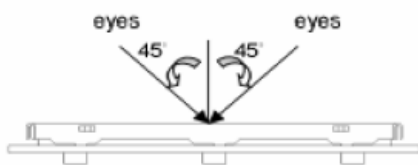


Fig.1

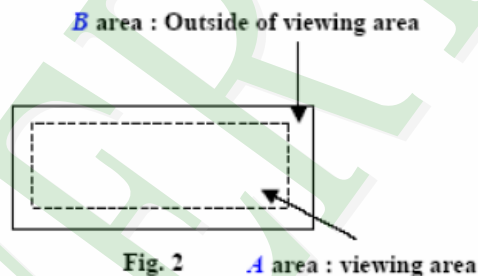


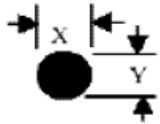
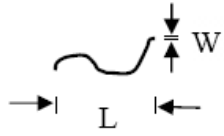
Fig. 2

◆ Specification:

NO	Item	Criterion	Level
01	Product condition	1. 1 The part number is inconsistent with work order of Production.	Major
		1. 2 Mixed production types.	Major
		1. 3 Assembled in inverse direction.	Major
02	Quantity	2. 1 The quantity is inconsistent with work order of production.	Major
03	Outline dimension	3. 1 Product dimension and structure must conform to Structure diagram.	Major
04	Electrical Testing	4. 1 Missing line character and icon.	Major
		4. 2 No function or no display.	Major
		4. 3 Output data is error.	Major
		4. 4 LCD viewing angle defect.	Major
		4. 5 Current consumption exceeds product specifications.	Major

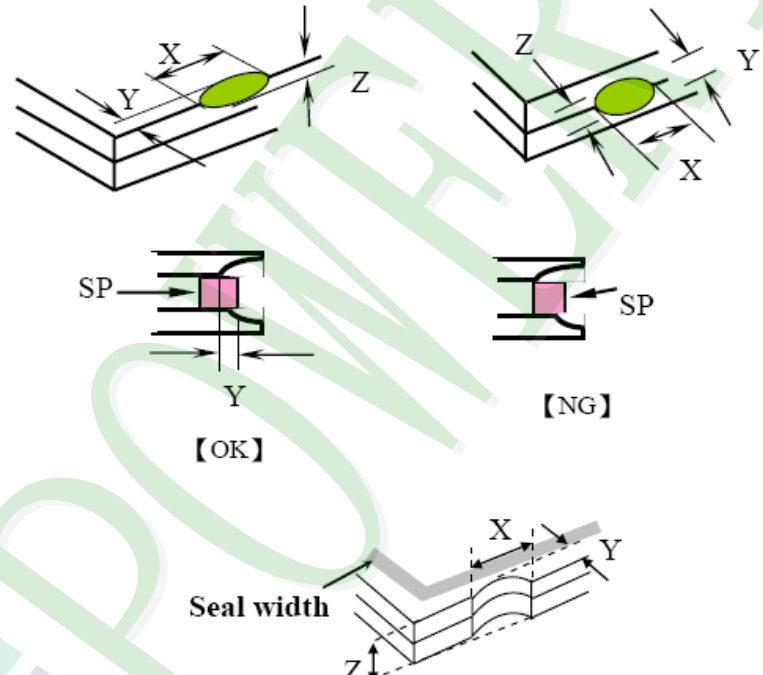
◆ Specification For Monotype and Color STN :

(Ver. B01)

NO	Item	Criterion	Level																																				
05	<p>Black or white dot 、 scratch 、 contamination</p> <p>Round type</p>  <p>$\Phi = (x+y)/2$</p> <p>Line type</p> 	<p>5. 1 Round type:</p> <p>5. 1. 1 display only :</p> <ul style="list-style-type: none"> • White and black spots on display ≤ 0.30 mm , no more than 4 white or black spots present. • Densely spaced : NO more than two spots or lines within 3 mm. <p>5. 1. 2 Non-display :</p> <table border="1"> <thead> <tr> <th rowspan="2">Dimension (diameter : Φ)</th> <th colspan="2">Acceptance (Q'ty)</th> </tr> <tr> <th>A area</th> <th>B area</th> </tr> </thead> <tbody> <tr> <td>$\Phi \leq 0.10$</td> <td colspan="2">Accept no dense</td> </tr> <tr> <td>$0.10 < \Phi \leq 0.20$</td> <td>3</td> <td rowspan="3">Ignore</td> </tr> <tr> <td>$0.20 < \Phi \leq 0.30$</td> <td>2</td> </tr> <tr> <td>Total quantity</td> <td>4</td> </tr> </tbody> </table> <p>5. 1. 3 Line type:</p> <table border="1"> <thead> <tr> <th colspan="2">Dimension</th> <th colspan="2">Acceptance (Q'ty)</th> </tr> <tr> <th>Length (L)</th> <th>Width (W)</th> <th>A area</th> <th>B area</th> </tr> </thead> <tbody> <tr> <td>---</td> <td>$W \leq 0.03$</td> <td>Accept no dense</td> <td rowspan="3">Ignore</td> </tr> <tr> <td>$L \leq 3.0$</td> <td>$0.03 < W \leq 0.05$</td> <td rowspan="2">4</td> </tr> <tr> <td>$L \leq 2.5$</td> <td>$0.05 < W \leq 0.075$</td> </tr> <tr> <td>---</td> <td>$W > 0.075$</td> <td colspan="2">As round type</td> </tr> </tbody> </table>	Dimension (diameter : Φ)	Acceptance (Q'ty)		A area	B area	$\Phi \leq 0.10$	Accept no dense		$0.10 < \Phi \leq 0.20$	3	Ignore	$0.20 < \Phi \leq 0.30$	2	Total quantity	4	Dimension		Acceptance (Q'ty)		Length (L)	Width (W)	A area	B area	---	$W \leq 0.03$	Accept no dense	Ignore	$L \leq 3.0$	$0.03 < W \leq 0.05$	4	$L \leq 2.5$	$0.05 < W \leq 0.075$	---	$W > 0.075$	As round type		Minor
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◆ Specification For Monotype and Color STN :

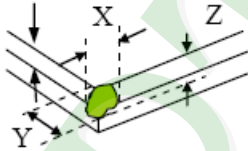
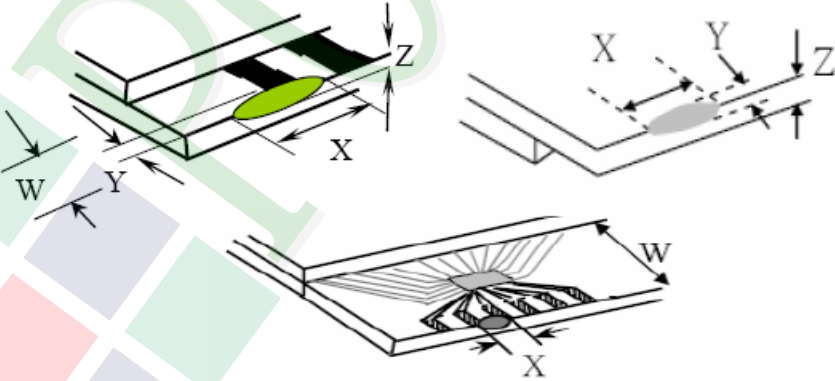
(Ver. B01)

NO	Item	Criterion	Level									
07	The crack of glass	<p>Symbols :</p> <p>X : The length of crack Z : The thickness of crack t : The thickness of glass</p> <p>Y : The width of crack. W : terminal length a : LCD side length</p> <hr/> <p>7.1 General glass chip :</p> <p>7.1.1 Chip on panel surface and crack between panels:</p>  <table border="1" data-bbox="502 1568 1300 1859"> <thead> <tr> <th>X</th> <th>Y</th> <th>Z</th> </tr> </thead> <tbody> <tr> <td>$\leq a$</td> <td>Crack can't enter viewing area</td> <td>$\leq 1/2 t$</td> </tr> <tr> <td>$\leq a$</td> <td>Crack can't exceed the half of SP width.</td> <td>$1/2 t < Z \leq 2 t$</td> </tr> </tbody> </table>	X	Y	Z	$\leq a$	Crack can't enter viewing area	$\leq 1/2 t$	$\leq a$	Crack can't exceed the half of SP width.	$1/2 t < Z \leq 2 t$	Minor
		X	Y	Z								
$\leq a$	Crack can't enter viewing area	$\leq 1/2 t$										
$\leq a$	Crack can't exceed the half of SP width.	$1/2 t < Z \leq 2 t$										



◆ Specification For Monotype and Color STN :

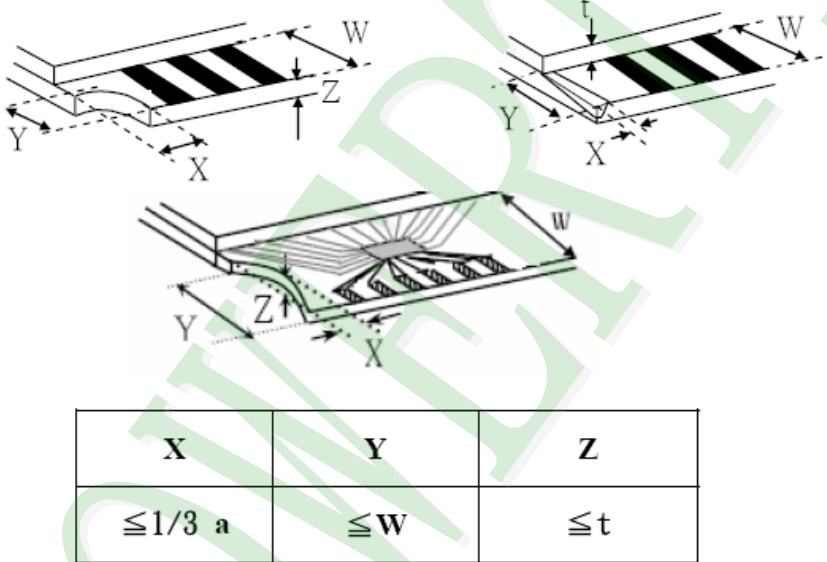
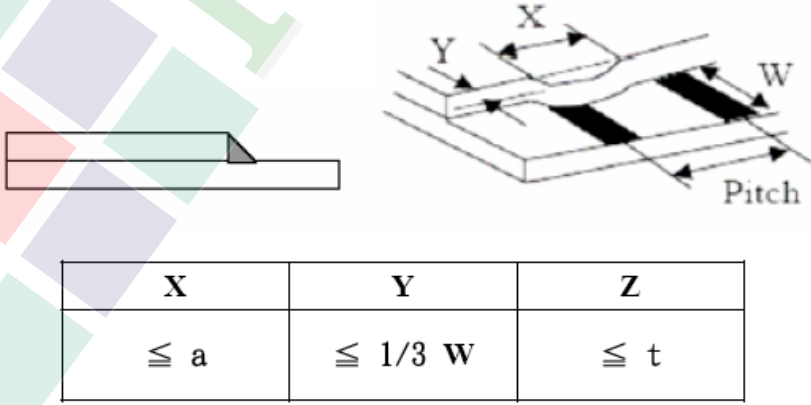
(Ver. B01)

NO	Item	Criterion	Level									
07	The crack of glass	<p>Symbols :</p> <p>X : The length of crack Z : The thickness of crack t : The thickness of glass</p> <p>Y : The width of crack. W : terminal length a : LCD side length</p> <hr/> <p>7.1.2 Corner crack :</p>  <table border="1" data-bbox="501 887 1318 1178"> <thead> <tr> <th>X</th> <th>Y</th> <th>Z</th> </tr> </thead> <tbody> <tr> <td>$\leq 1/5 a$</td> <td>Crack can't enter viewing area</td> <td>$Z \leq 1/2 t$</td> </tr> <tr> <td>$\leq 1/5 a$</td> <td>Crack can't exceed the half of SP width.</td> <td>$1/2 t < Z \leq 2 t$</td> </tr> </tbody> </table>	X	Y	Z	$\leq 1/5 a$	Crack can't enter viewing area	$Z \leq 1/2 t$	$\leq 1/5 a$	Crack can't exceed the half of SP width.	$1/2 t < Z \leq 2 t$	Minor
		X	Y	Z								
$\leq 1/5 a$	Crack can't enter viewing area	$Z \leq 1/2 t$										
$\leq 1/5 a$	Crack can't exceed the half of SP width.	$1/2 t < Z \leq 2 t$										
<p>7.2 Protrusion over terminal :</p> <p>7.2.1 Chip on electrode pad :</p>  <table border="1" data-bbox="467 1760 1254 1933"> <thead> <tr> <th></th> <th>X</th> <th>Y</th> <th>Z</th> </tr> </thead> <tbody> <tr> <td>Front</td> <td>$\leq a$</td> <td>$\leq 1/2 W$</td> <td>$\leq t$</td> </tr> <tr> <td>Back</td> <td colspan="3">Neglect</td> </tr> </tbody> </table>		X	Y	Z	Front	$\leq a$	$\leq 1/2 W$	$\leq t$	Back	Neglect		
	X	Y	Z									
Front	$\leq a$	$\leq 1/2 W$	$\leq t$									
Back	Neglect											



◆ Specification For Monotype and Color STN :

(Ver. B01)

NO	Item	Criterion	Level
07	The crack of glass	<p>Symbols :</p> <p>X : The length of crack Z : The thickness of crack t : The thickness of glass</p> <p>Y : The width of crack. W : terminal length a : LCD side length</p>	Minor
		<p>7.2.2 Non-conductive portion :</p>  <p>⊙ If the chipped area touches the ITO terminal, over 2/3 of the ITO must remain and be inspected according to electrode terminal specifications.</p> <p>7.2.3 Glass remain :</p> 	



◆ Specification For Monotype and Color STN :

(Ver. B01)

NO	Item	Criterion	Level
08	Backlight elements	8. 1 Backlight can't work normally.	Major
		8. 2 Backlight doesn't light or color is wrong.	Major
		8. 3 Illumination source flickers when lit.	Major
09	General appearance	9. 1 Pin type must match type in specification sheet.	Major
		9. 2 No short circuits in components on PCB or FPC.	Major
		9. 3 Product packaging must the same as specified on packaging specification sheet.	Minor
		9. 4 The folding and peeled off in polarizer are not acceptable.	Minor
		9. 5 The PCB or FPC between B/L assembled distance (PCB or FPC) is ≤ 1.5 mm.	Minor



5. PRECAUTION RELATING PRODUCT HANDLING

5.1 SAFETY

- 5.1.1 If the LCD panel breaks , be careful not to get the liquid crystal to touch your skin.
- 5.1.2 If the liquid crystal touches your skin or clothes , please wash it off immediately by using soap and water.

5.2 HANDLING

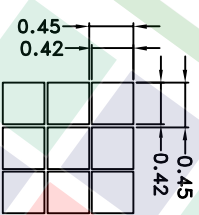
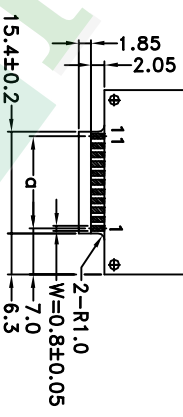
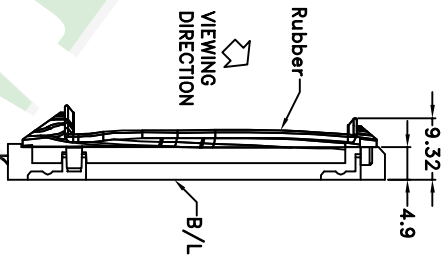
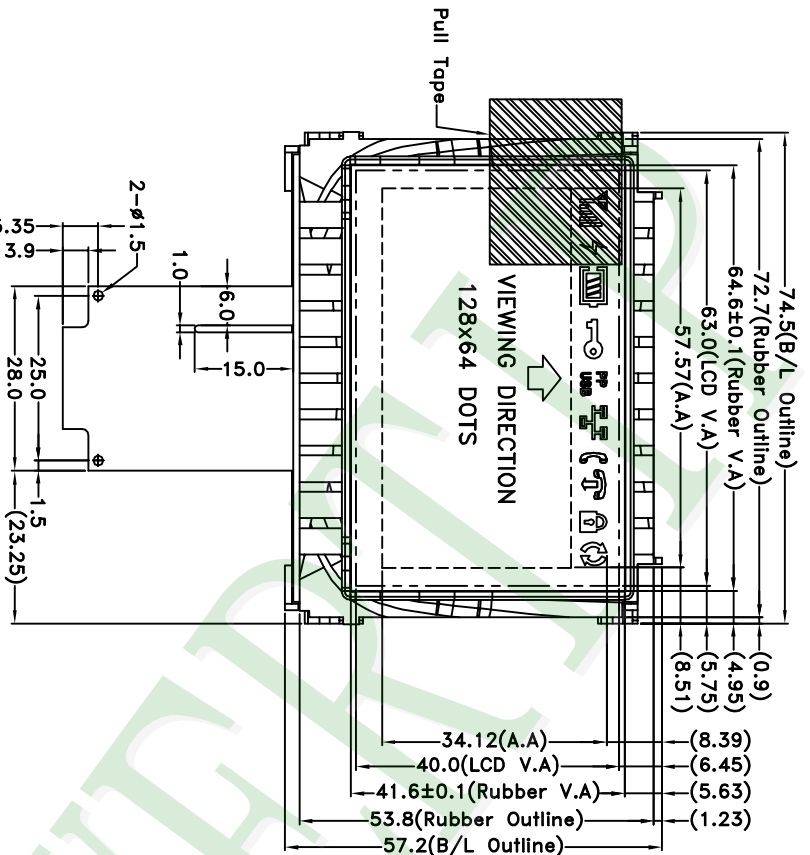
- 5.2.1 Avoid any strong mechanical shock which can break the glass.
- 5.2.2 Avoid static electricity which can damage the CMOS LSI—When working with the module , be sure to ground your body and any electrical equipment you may be using.
- 5.2.3 Do not remove the panel or frame from the module.
- 5.2.4 The polarizing plate of the display is very fragile. So , please handle it very carefully ,do not touch , push or rub the exposed polarizing with anything harder than an HB pencil lead (glass , tweezers , etc.)
- 5.2.5 Do not wipe the polarizing plate with a dry cloth , as it may easily scratch the surface of plate.
- 5.2.6 Do not touch the display area with bare hands , this will stain the display area.
- 5.2.7 Do not use ketonics solvent & aromatic solvent. Use with a soft cloth soaked with a cleaning naphtha solvent.
- 5.2.8 Do not apply force on LCD panel.

5.3 STORAGE

- 5.3.1 Store the panel or module in a dark place where the temperature is $25^{\circ}\text{C} \pm 5^{\circ}\text{C}$ and the humidity is below 65% RH.
- 5.3.2 Do not place the module near organics solvents or corrosive gases.
- 5.3.3 Do not crush , shake , or jolt the module.

5.4 TERMS OF WARRANTY

- 5.4.1 Applicable warrant period
The period is within thirteen months since the date of shipping out under normal using and storage conditions.
- 5.4.2 Unaccepted responsibility
This product has been manufactured to your company's specification as a part for use in your company's general electronic products. It is guaranteed to perform according to delivery specifications. For any other use apart from general electronic equipment , we cannot take responsibility if the product is used in nuclear power control equipment , aerospace equipment , fire and security systems or any other applications in which there is a direct risk to human life and where extremely high levels of reliability are required.



- NOTES:
- 1.LCD TYPE:FSTN
 - 2.LCD DISPLAY:POSITIVE/Transflective
 - 3.VIEW DIRECTION: 6 O'CLOCK
 - 4.Top: -5~50°C Tst:-20~70°C
 - 5.The tolerance unless classified ±0.3mm
 - 6.I.C NO.:SSD1805Z
 - 7.LED COLOR:YELLOW-GREEN x 10PCS
 - 8.a:P1.4X10=14.0±0.05
 - 9.Rubber: Silicon KE-951U from Shin Etsu UL listed E48923
 - 10.FPC: QTHD from QT-FLEX UL listed E305211
 - 11.EPO5 from EpplusCo.E322964

005									
004									
003									
002	Add FPC description	Shawn	2009/05/26						
001	Modify version of LCM	Mag	2009/02/11						
A	Add notes	Mag	2007/1/26						
0	NEW DRAWING	Eva	2007/0/08						
REV		REV BY		REVISER		DATE			

PART NO:	PE12864LRF-028-H-Q
DRAWING NAME:	LMD-PE12864LRF-028-H-Q
TITLE:	LCD Module Drawing

Design	Shawn	Unit	MM	Surface		Length (mm)	1 ~ 4	Precision Level	
Check	Eddy	Scale	1:1.1	Material	Thickness	63 ~ 250	16 ~ 63		
Approve	Ryan	Page	1/1	Quantity		250 ~ 1000			

江蘇久正光電有限公司
JIANGSU POWER TIP TECHNOLOGY CORP.LTD.

LCM包裝規格書

Ver.002

Documents NO. PKG-PE12864LRF-028-H-Q

LCM Packaging Specifications
(For Tray)

Approve	Check	Design
Ryan	Terry	Sally

1. 包裝材料規格表 (Packaging Material) : (per carton)

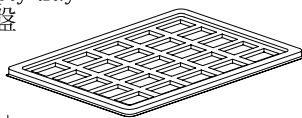
No.	Item	Model	Dimensions (mm)	1Pcs Weight	Quantity	Total Weight
1	成品 (LCD)	PE12864LRF-028-H-Q	74.5 X 57.2	0.032	192	6.144
2	多層薄膜(1)POF	OTFILM0BA03ABA	—————	—————	192	—————
3	TRAY 盤 (2)Tray	TYPE12806428BA	352 X 260 X 21.3	0.0975	28	2.73
4	內盒(3)Product Box	BX00000000022	393 X 274 X 107	0.261	4	1.044
5	保利龍板(4)Polylon board	OTPLB00000008	550 X 393 X 15	0.022	2	0.044
6	外紙箱(5)Carton	BX57041027CCBA	570 X 410 X 265	1.4208	1	1.4208
7						
8						
9						
10						

2. 一整箱總重量 (Total LCD Weight in carton) : 11.38 Kg±10%

3. 單箱數量規格表 (Packaging Specifications and Quantity) :

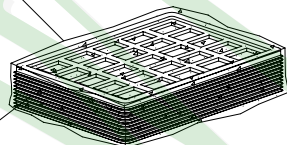
(1)LCD quantity per box : no per tray	8	x no of tray	6	=	48
(2)Total LCD quantity in carton : quantity per box	48	x no of boxes	4	=	192

Use empty tray
空盤

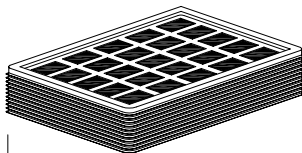


+

(1)多層薄膜
POF



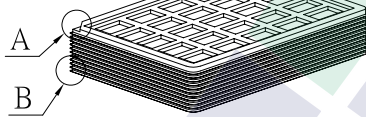
Put products into the tray



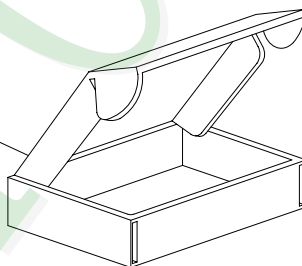
(2)TRAY 盤
Tray

⇓

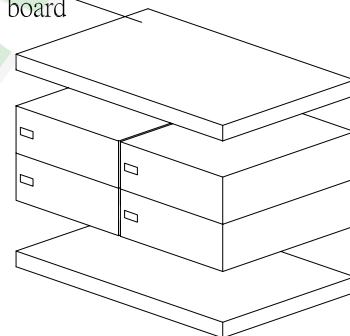
Tray stacking



(3)內盒
Product Box

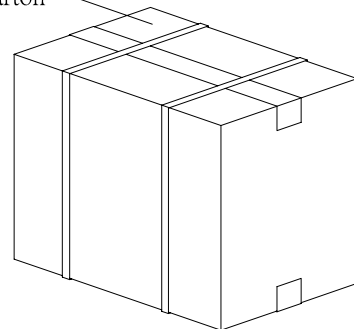


(4)保利龍板
Polylon board



⇓

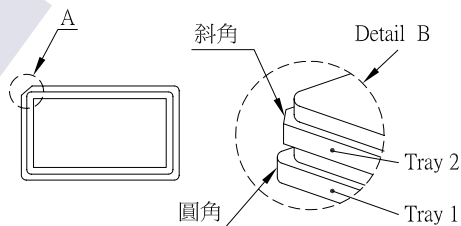
(5)外紙箱
Carton



特 記 事 項 (REMARK)

4. Label Specifications :

MODEL:
LOT NO:
QUANTITY:
CHECK:



5. TRAY盤相疊時,需旋轉180度,請詳見B視圖
Rotate tray 180 degrees and place on top of stack.
Check the tray stack using Fig. B.