



# Wincom Tech. CO., LTD.

## The LCD(M) Specialist

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PART NO. : COG12864D

FOR MESSRS. : \_\_\_\_\_

### CONTENTS

<i>NO.</i>	<i>ITEM</i>	<i>PAGE</i>
1.	COVER	1
2.	RECORD OF REVISION	2
3.	GENERAL SPECIFICATION	3
4.	Feature	3
5.	Mechanical Specs	3
6.	ELECTRICAL CHARACTERISTICS	4
7.	Power Supply and Block Diagram	5
8.	Electro – Optical Characteristics	6
9.	Interface Pin Assignment	7
10	Command list	8
11	Timing	9
12	Mechanical Drawing	10

ACCEPTED BY: ..... PROPOSED BY: .....

**RECORD OF REVISION**

<b>DATE</b>	<b>PAGE</b>	<b>SUMMARY</b>

### 3. General specifications

#### 3.1 General specifications

PLEASE REFER TO:

“CUSTOMER ACCEPTANCE STANDARD SPECIFICATIONS (MS-10-10000)”.

#### 3.2 Quality Assurance and Warranty

PLEASE REFER TO:

“QUALITY ASSURANCE MANUL (MS-10-10001)”.

#### 3.3 This individual specification is prior to general specifications

### 4. Features

- \* Display Model: STN Negative , Transflective;
- \* Color :     Display dot    : White;  
                  Back ground : Blue;  
                  (STN negative with white LED back light is available)
- \* Display Format :   128 x 64 dots;
- \* IC : S1D1565D11B00;
- \* Interface Input Data : 8-bit Parallel 8080 MPU;
- \* Driving Method : 1/65 Duty, 1/9 bias;
- \* Viewing Direction: 6 o'clock;
- \* Back light : No

### 5. Mechanical Specs.

Item	Specification	Unit
Module Size	77.4(W) X 92(H) X 2.8MAX(T)	mm
Viewing Area	70.7(W) X 38.8(H)	mm
Effective Display Area	66.52(W) X 33.24(H)	mm
Number of Dots	128 X 64Dots	
Dot Size	0.48(W) X 0.48(H)	mm
Dot Pitch	0.52(W) X 0.52(H)	mm

## 6. Electrical characteristics

Ta = 25°C VDD = 5.0 ± 0.25 V

### 6.1 Absolute Max Rating

Item	Symbol	Standard Value			Unit
		Min.	Typ.	Max.	
Supply Voltage For Logic	V <sub>DD</sub> -V <sub>SS</sub>	2.0	-	5.5	V
Supply Voltage For LCD Drive	V <sub>DD</sub> -V <sub>5</sub>	4.0	-	13.0	V
Input Voltage	V <sub>IN</sub>	-0.3	-	V <sub>DD</sub> +0.3	V
Operating Temp.	T <sub>OP</sub>	-20	-	70	°C
Storage Temp.	T <sub>ST</sub>	-30	-	+80	°C
Static Electricity	Be sue that you are ground when handing LCM				

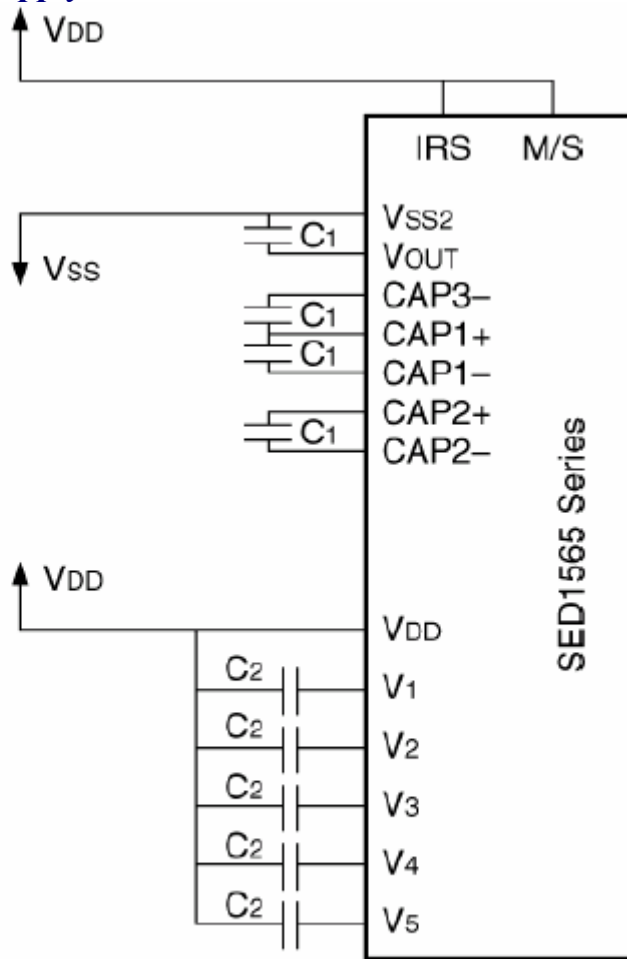
### 6.2 Electrical characteristics;

Item	Symbol	Test Condition	Min.	Typ.	Max.	Unit	
Supply Voltage For Logic	V <sub>DD</sub> - V <sub>SS</sub>	Ta=25°C	2.1	3.0	3.6	V	
Supply Voltage For LCD	V <sub>DD</sub> - V <sub>5</sub>	Ta=25°C	8.6	9.2	9.7	V	
Input Voltage	"H" Level	V <sub>IH</sub>	Ta=25°C	0.8V <sub>DD</sub>		V <sub>DD</sub>	V
	"L" Level			V <sub>IL</sub>	V <sub>SS</sub>		0.2V <sub>DD</sub>
Output Voltage	"H" Level	V <sub>OH</sub>	I <sub>OUT</sub> = -0.1mA	0.8V <sub>DD</sub>	-	V <sub>DD</sub>	V
	"L" Level	V <sub>OL</sub>	I <sub>OUT</sub> = 0.1mA	V <sub>SS</sub>	-	0.2V <sub>DD</sub>	V
Current Consumption	I <sub>DD</sub>	V <sub>IN</sub> = V <sub>DD</sub>	-	0.50	1	mA	

NOTE: 1)Duty ratio=1/64, Bias=1/9  
2).Measured in Dots ON-state

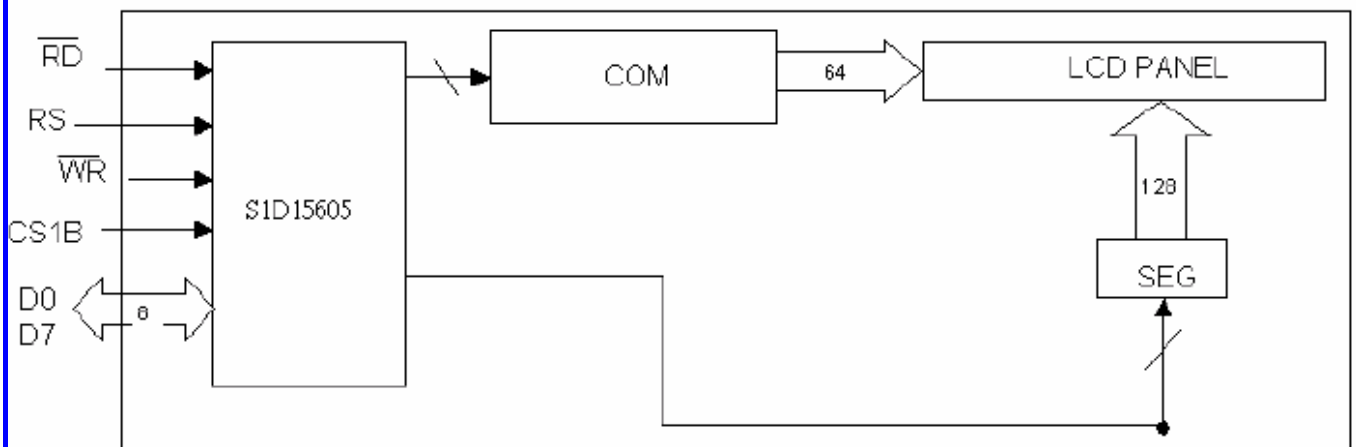
## 7. Power supply and block diagram

### 7.1 Power supply



**Note:** C1 : 1.0~4.7  $\mu$ F      C2: 0.1~1.0  $\mu$ F

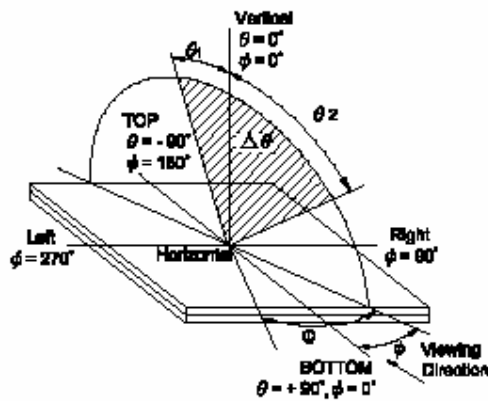
### 7.2 Block Diagram



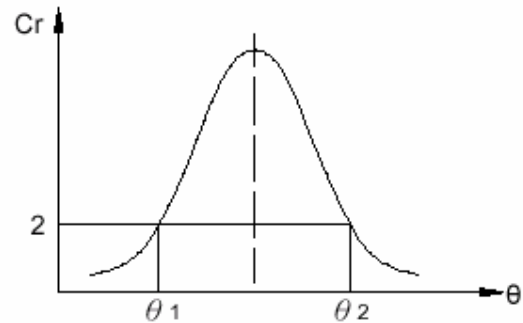
## 8. Electro – Optical Characteristics

Item	Symbol	Temp.	Min.	Typ.	Max.	Unit	Conditions	Note
Viewing Angle	$ \theta_2 - \theta_1 $	25°C	30	70	-	Deg.	-	1,2
	$\Phi$		60	88	-			
Contrast Ratio	Cr	25°C	2	4.7	5.5	-	$\theta=0^\circ$ $\Phi=0^\circ$	3
Response Time(rise)	Tr	25°C	-	79	250	ms	$\theta=0^\circ$ $\Phi=0^\circ$	4
		0°C	-	950	1150			
Response Time(fall)	Tf	25°C	-	61	250	ms	$\theta=0^\circ$ $\Phi=0^\circ$	4
		0°C	-	950	1150			

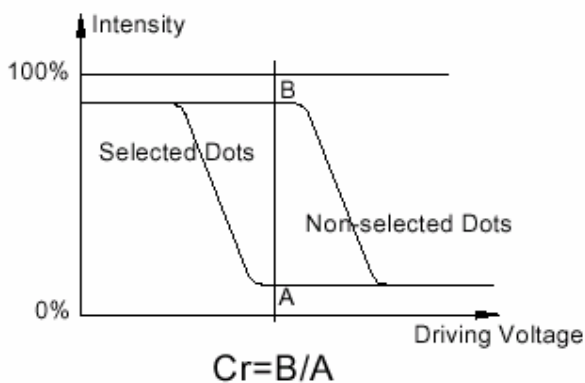
Note1 . Definition of Angle  $\theta$ & $\Phi$



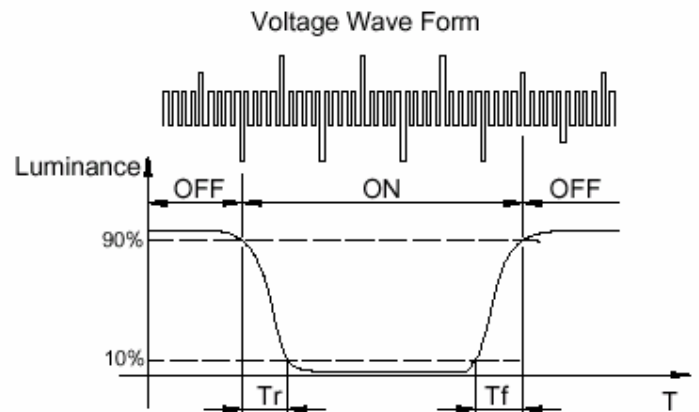
Note2. Definition of Viewing Angle  $\theta_1$ & $\theta_2$



Note3 . Definition of Contrast Cr



Note4. Definition of Optical Response



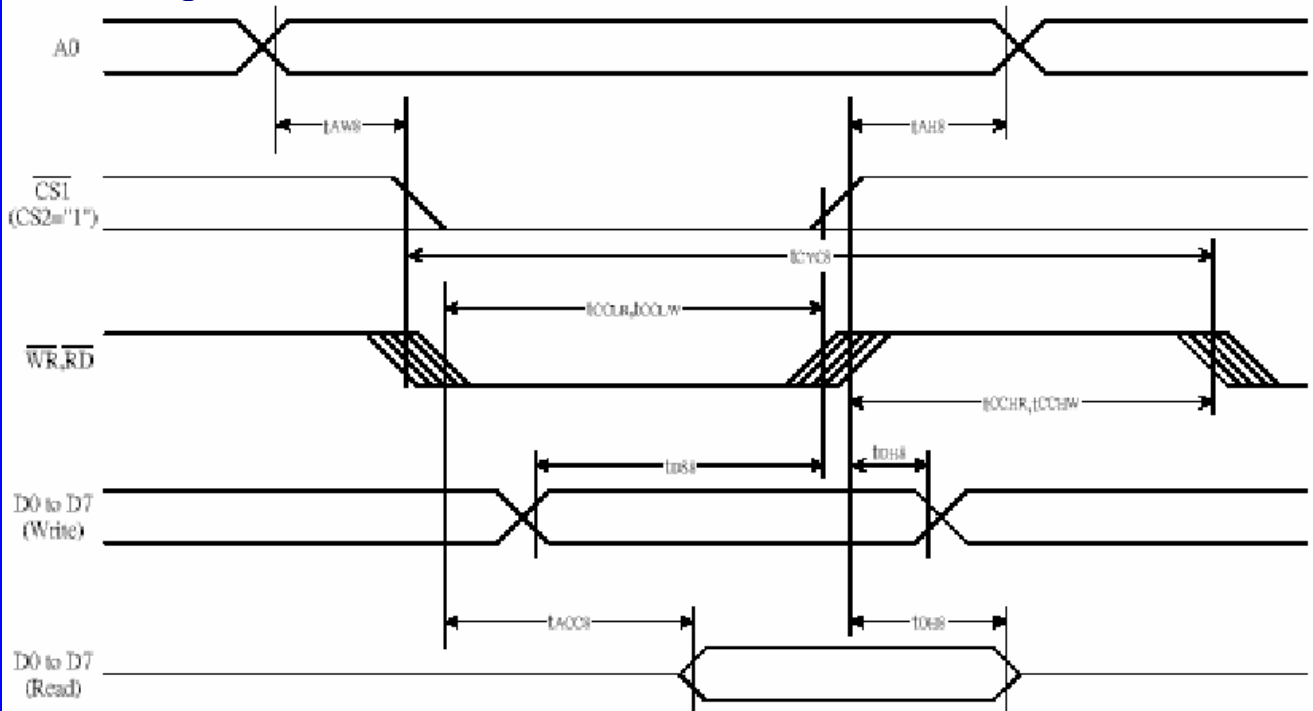
### 9.Interface Pin Assignment

Pin NO.	Symbol	I / O	Functions
1	/CS1	I	This is the chip select signal.
2	REST	I	When RES is set to "L", the setting are initialized.
3	A0	I	This is connect to the least significant bit of the Norman MPU address bus, and it determines whether the data bits are data or a command.
4	/WR	I	The data bus are latched at the rising edge of the WR signal
5	E(/RD)	I	The data bus is in output status when this signal is "L"
6~13	D0~D7	I/O	This is an 8-bit bi-directional data bus that connects to an 8-bit or 16-bit standard MPU data bus.
14	V <sub>DD</sub>	Power supply	Shared with the MPU power supply terminal V <sub>CC</sub>
15	V <sub>SS</sub>	Power supply	This is a 0v terminal connected to the system GND.
16	V <sub>OUT</sub>	O	DC/DC voltage converter. Connect a capacitor between this terminal and v <sub>ss</sub>
17	CAP3-	O	DC/DC voltage converter. Connect a capacitor between this terminal and the CAP1+ terminal.
18	CAP1+	O	DC/DC voltage converter. Connect a capacitor between this terminal and the CAP1- terminal.
19	CAP1-	O	DC/DC voltage converter. Connect a capacitor between this terminal and the CAP1+ terminal.
20	CAP2-	O	DC/DC voltage converter. Connect a capacitor between this terminal and the CAP2+ terminal.
21	CAP2+	O	DC/DC voltage converter. Connect a capacitor between this terminal and the CAP2- terminal.
22~26	V1~V5	Power supply	This is a multi-level power supply for the liquid crystal drive.

## 10. Command List

Command	Command Code									Function		
	A0	$\overline{RD}$	$\overline{WR}$	D7	D6	D5	D4	D3	D2		D1	D0
(1) Display ON/OFF	0	1	0	1	0	1	0	1	1	1	0	1
(2) Display start line set	0	1	0	0	1	Display start address						
(3) Page address set	0	1	0	1	0	1	1	Page address				
(4) Column address set upper bit	0	1	0	0	0	0	1	Most significant column address				
Column address set lower bit	0	1	0	0	0	0	0	Least significant column address				
(5) Status read	0	0	1	Status				0	0	0	0	
(6) Display data write	1	1	0	Write data								
(7) Display data read	1	0	1	Read data								
(8) ADC select	0	1	0	1	0	1	0	0	0	0	0	1
(9) Display normal/reverse	0	1	0	1	0	1	0	0	1	1	0	1
(10) Display all points ON/OFF	0	1	0	1	0	1	0	0	1	0	0	1
(11) LCD bias set	0	1	0	1	0	1	0	0	0	1	0	1
(12) Read/modify/write	0	1	0	1	1	1	0	0	0	0	0	
(13) End	0	1	0	1	1	1	0	1	1	1	0	
(14) Reset	0	1	0	1	1	1	0	0	0	1	0	
(15) Common output mode select	0	1	0	1	1	0	0	0	*	*	*	
(16) Power control set	0	1	0	0	0	1	0	1	Operating mode			
(17) V <sub>S</sub> voltage regulator internal resistor ratio set	0	1	0	0	0	1	0	0	Resistor ratio			
(18) Electronic volume mode set	0	1	0	1	0	0	0	0	0	0	0	1
Electronic volume register set				*	*	Electronic volume value						
(19) Static indicator ON/OFF	0	1	0	1	0	1	0	1	1	0	0	1
Static indicator register set				*	*	*	*	*	*	Mode		
(20) Booster ratio set	0	1	0	1	1	1	1	1	0	0	0	
				*	*	*	*	*	*	step-up value		
(21) Power saver												
(22) NOP	0	1	0	1	1	1	0	0	0	1	1	

## 11. Timing Character

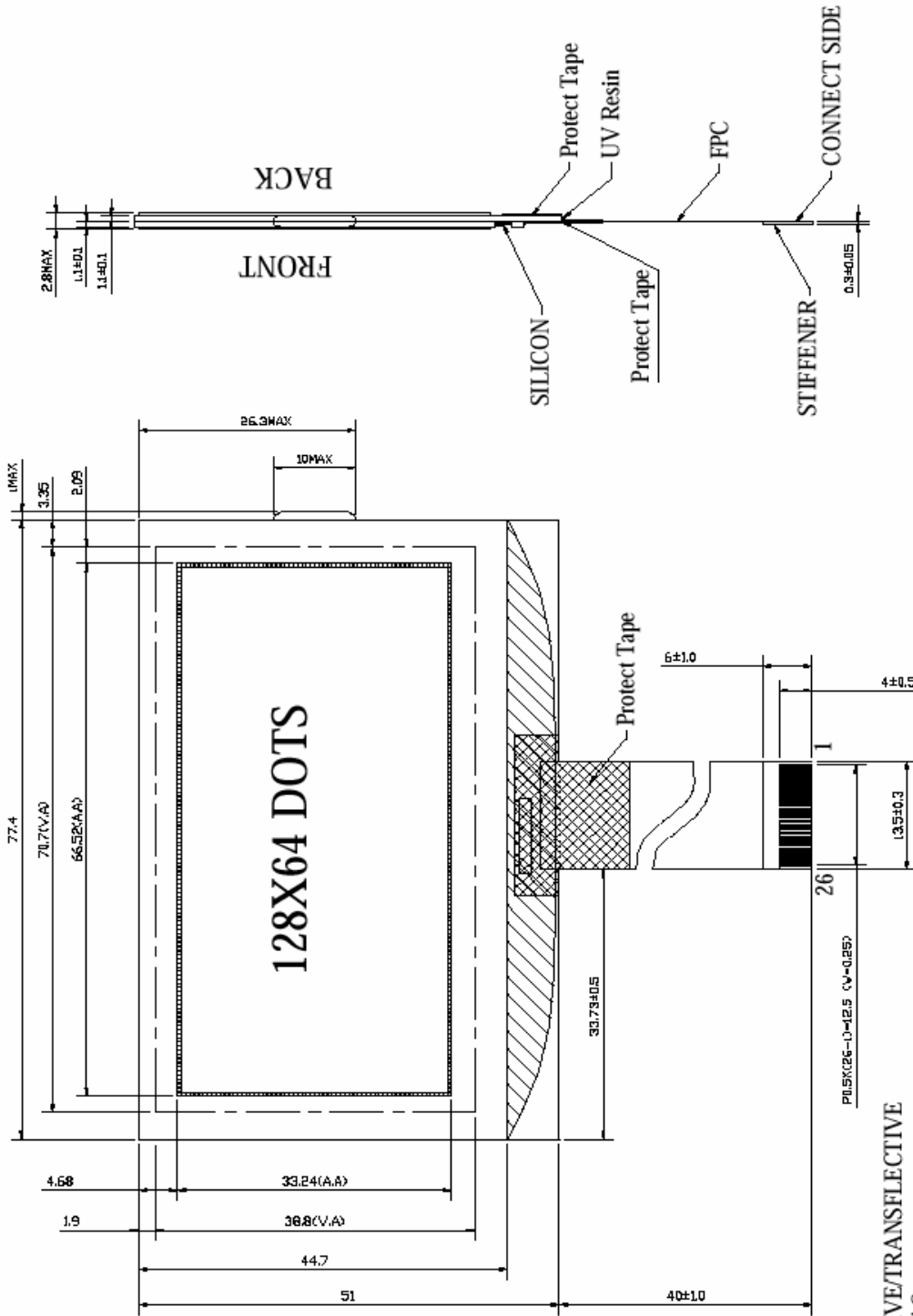
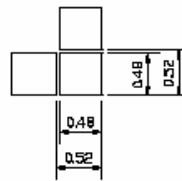


Item	Signal	Symbol	Condition	Rating		Units
				Min.	Max.	
Address hold time	A0	$t_{AHS}$		0	—	ns
Address setup time		$t_{AWB}$		0	—	
System cycle time		$t_{CYCS}$		240	—	
Enable L pulse width (WRITE)	WR	$t_{OCLW}$		80	—	
Enable H pulse width (WRITE)		$t_{OCHW}$		80	—	
Enable L pulse width (READ)	RD	$t_{OCLR}$		140	—	
Enable H pulse width (READ)		$t_{OCHR}$		80	—	
WRITE Data setup time	D0 to D7	$t_{DSa}$		40	—	
WRITE Address hold time		$t_{DHS}$		0	—	
READ access time		$t_{ACC8}$	CL = 100 pF	—	70	
READ Output disable time		$t_{OHS}$	CL = 100 pF	5	50	

# 12.MechanicalDrawing

NO.	SYMBOL	NO.	SYMBOL
1	/CSI	14	VDD
2	RESET	15	VSS
3	A0	16	VOUT
4	/WR	17	CAP3-
5	E(/RD)	18	CAP1+
6	D0	19	CAP1-
7	D1	20	CAP2-
8	D2	21	CAP2+
9	D3	22	V1
10	D4	23	V2
11	D5	24	V3
12	D6	25	V4
13	D7	26	V5

DETAIL:DOTS



- NOTES:
- 1.DISPLAY TAPE:STN-BLUE/NEGATIVE/TRANSPARENT
  - 2.DRIVE METHOD:D:1/64 DUTY 1/9 BIAS
  - 3.VIEWING DIRECTION: 6 O'CLOCK
  - 4.OPERATING TEMP: -20°C~70°C
  - 5.STORAGE TEMP: -30°C~80°C
  - 6.CONNECTOR: COG+FPC
  - 7.VDD:3.0V
  - 8.VLCD:9.2V
  - 9.IC:SED1565D0B(COG)