

# SPECIFICATION FOR LCD MODULE

Model No. TM12864A2FFG

<b>Prepared by:</b>	<b>Date:</b>
<b>Checked by :</b>	<b>Date:</b>
<b>Verified by :</b>	<b>Date:</b>
<b>Approved by:</b>	<b>Date:</b>

**TIANMA MICROELECTRONICS CO., LTD**

Ver.1.0

## REVISION RECORD

Date	Ver.	Ref. Page	Revision No.	Revision Items
2003-3-29	Ver.1.0			

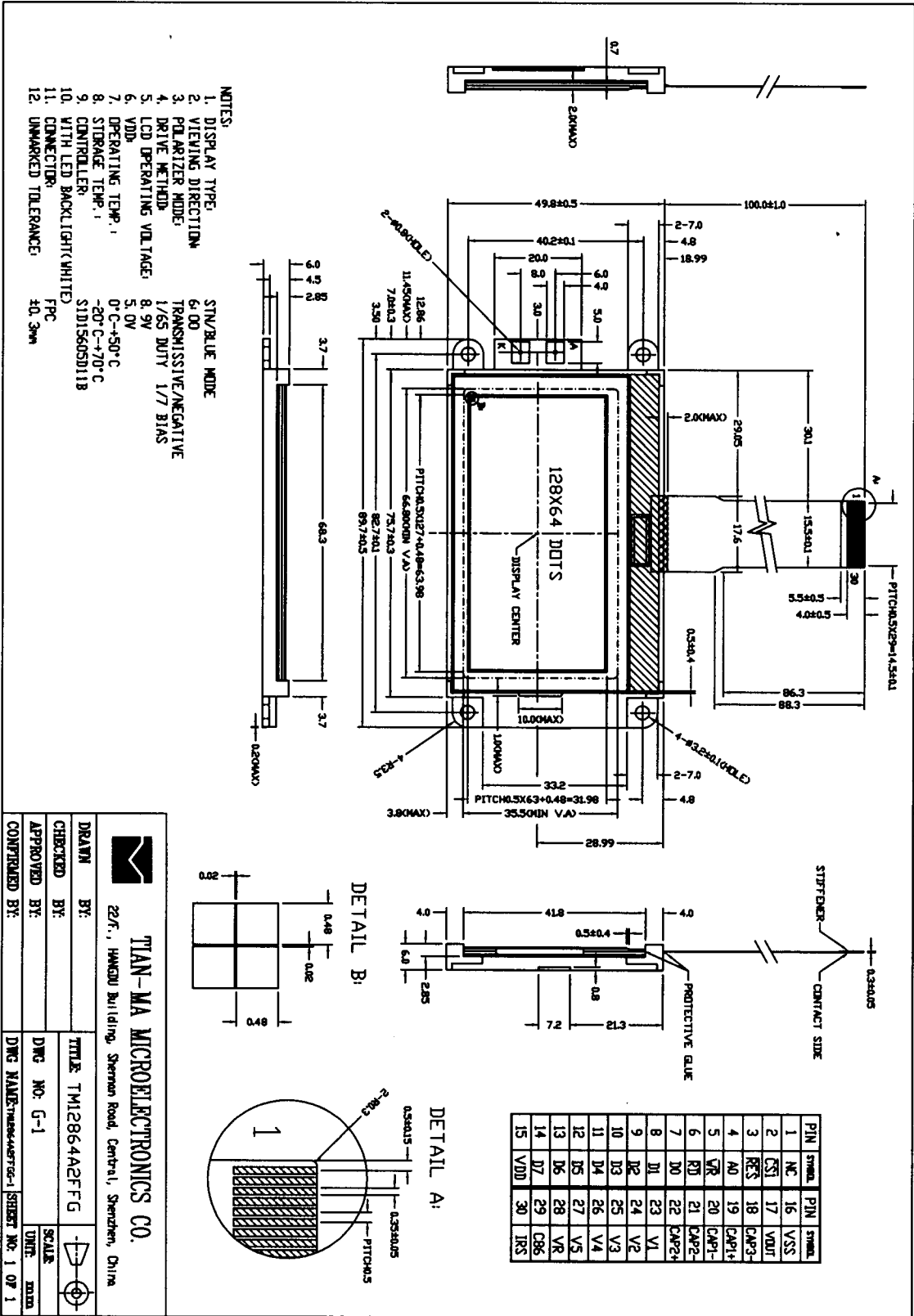
## **1 General Specifications:**

- 1.1 Display type: STN
- 1.2 Display color\*<sup>1</sup>:
  - Display color: White
  - Background\*<sup>2</sup>: Blue
- 1.3 Polarizer mode: Transmissive/Negative
- 1.4 Viewing Angle: 6:00
- 1.5 Driving Method: 1/65 Duty 1/7 Bias
- 1.6 Logic Voltage: 5.0V
- 1.7 LCD Operating Voltage: 8.9V
- 1.8 Backlight: LED(White,5.0V)
- 1.9 Controller: S1D15605D11D
- 1.10 Data Transfer: 8 Bit Parallel
- 1.11 Operating Temperature: 0----+50°C  
Storage Temperature: -20----+70°C
- 1.12 Outline Dimensions: Refer to outline drawing on next page
- 1.13 Dot Matrix: 128 X 64 Dots
- 1.14 Dot Size: 0.48X0.48(mm)
- 1.15 Dot Pitch: 0.5X0.5 (mm)
- 1.16 Weight: 45g(approx.)

\*<sup>1</sup> Color tone is slightly changed by temperature and driving voltage.

\*<sup>2</sup> Color tone will be changed by backlight.

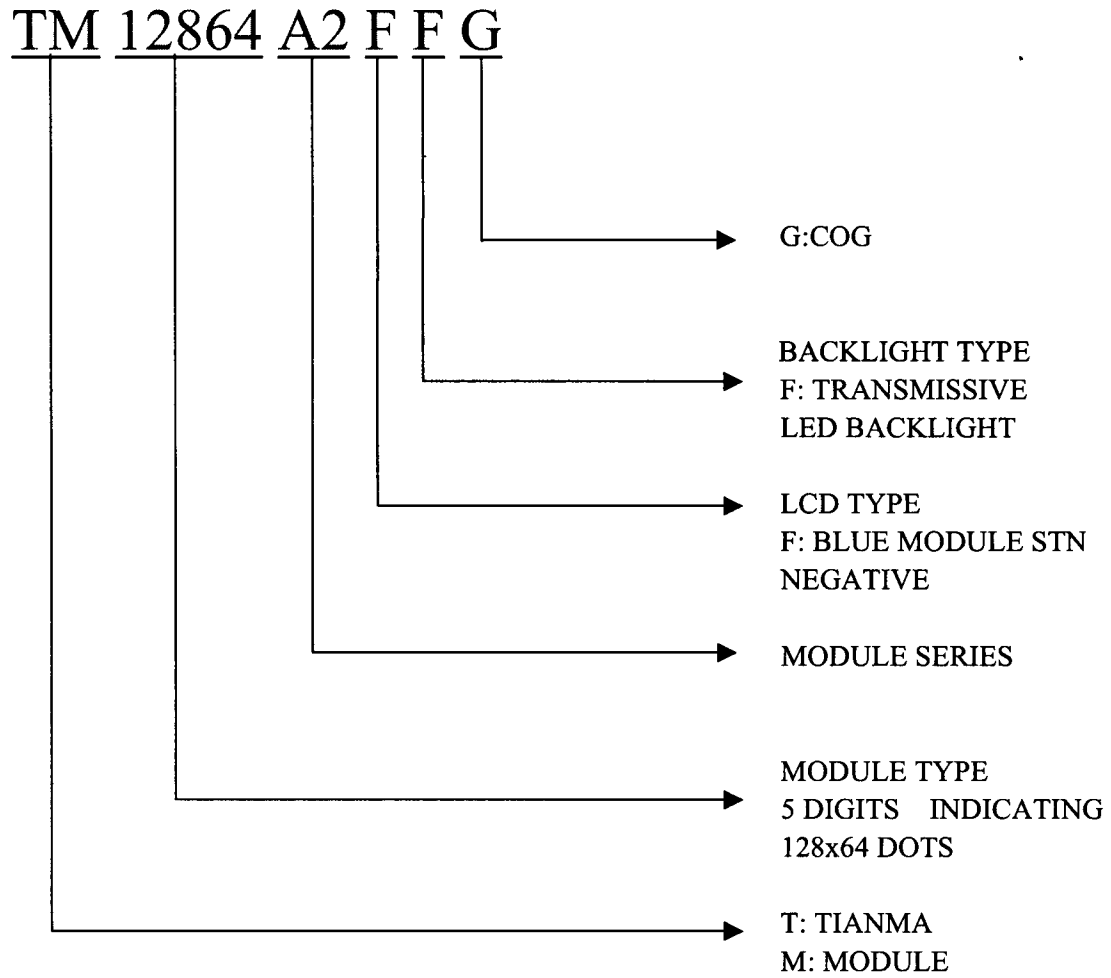
# 2 Outline Drawing



**TIAN-MA MICROELECTRONICS CO.**  
22/F, HANGOU Building, Sherman Road Central, Shenzhen, China

DRAWN BY:	TITLE: TM12864A2FG	SCALE:	1:1
CHECKED BY:	DWG NO: G-1	DATE:	2010
APPROVED BY:	DWG NAME: TM12864A2FG-1	SHEET NO:	1 OF 1
CONTROLLED BY:			

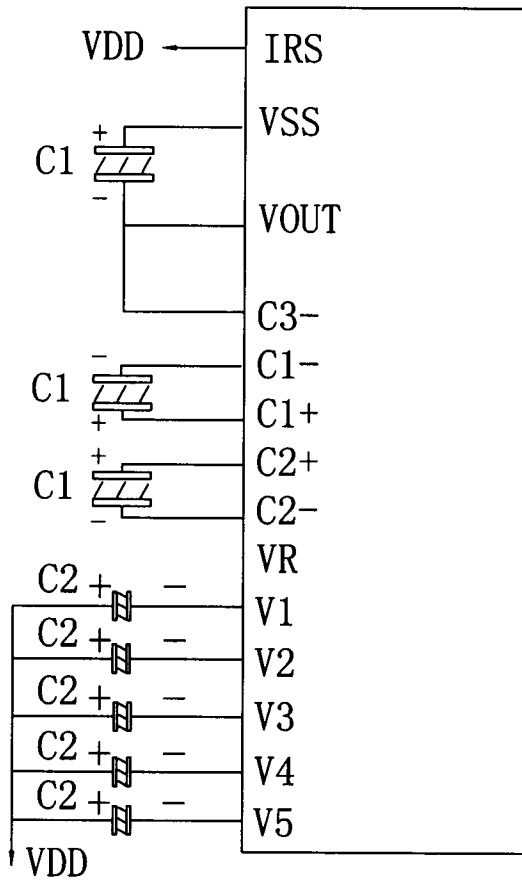
### 3 LCD Module Part Numbering System



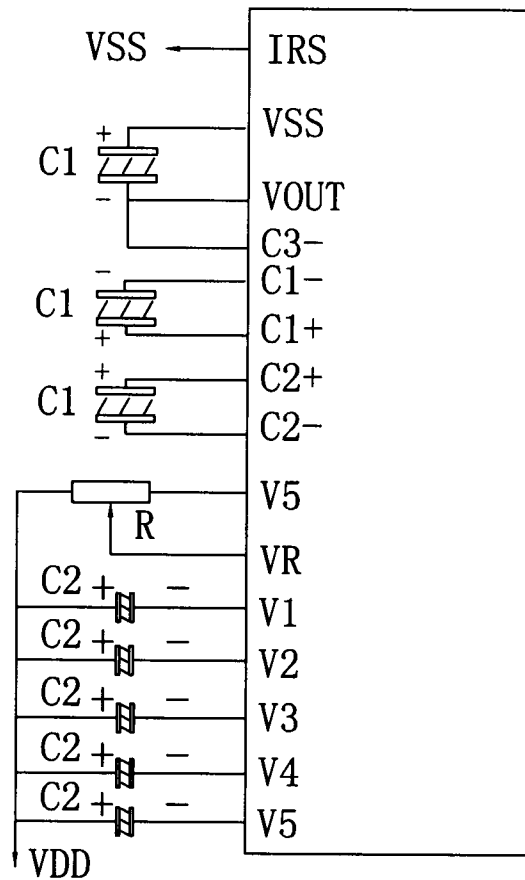


## 4.2 Power Supply Circuit

When the voltage regulator internal resistor is used



When the voltage regulator internal resistor is not used



### VALUE OF EXTERNAL CAPACITANCE

ITEM	VALUE	UNIT
C1	1.0 to 4.7	uF
C2	0.01 to 1.0	

### 5 Absolute Maximum Ratings

Item	Symbol	Min.	Max.	Unit	Remark
Power Supply Voltage	$V_{DD}-V_{SS}$	-0.3	6.0	V	
LCD Driving Voltage	$V_{LCD}$	-0.3	25.0		
Operating Temperature Range	$T_{OP}$	-0	+50	°C	No Condensation
Storage Temperature Range	$T_{ST}$	-20	+70		



## 6 Electrical Specifications and Instruction Code

### 6.1 Electrical characteristics

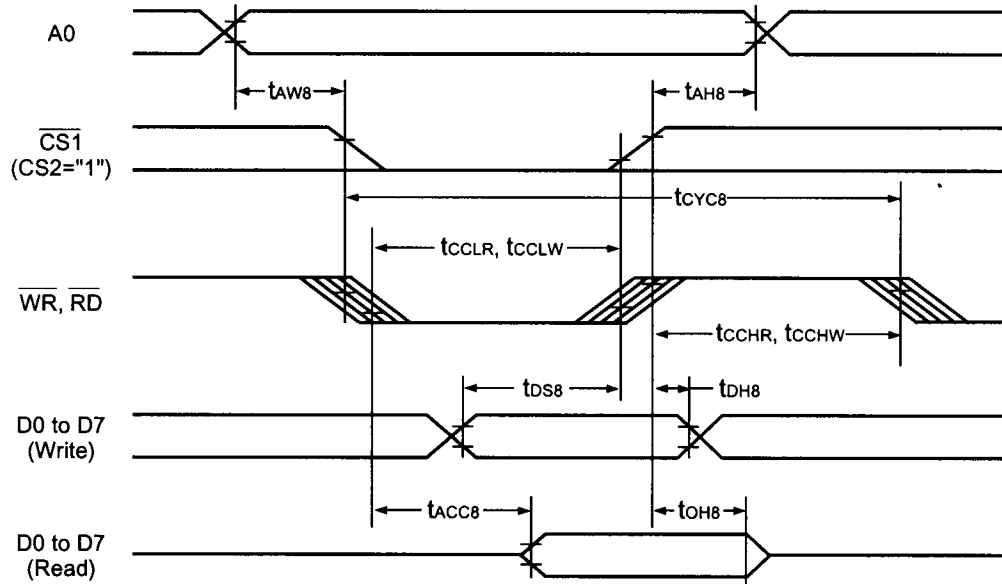
Item	Symbol	Min.	Typ.	Max.	Unit	
Supply Voltage (Logic)	$V_{DD}-V_{SS}$	4.5	5.0	5.5	V	
Supply Voltage (LCD Drive)	$V_{LCD}$	-	8.9	25.0	V	
Input Signal Voltage	High	$V_{IH}$ ( $V_{DD}=5.0$ )	$0.8V_{DD}$	-	$V_{DD}+0.3$	V
	Low	$V_{IL}$ ( $V_{DD}=5.0$ )	0	-	$0.2 V_{DD}$	V
Supply current (Logic)	$I_{DD}$ ( $V_{DD}-V_{SS}=3.0V$ )	-	-	300	$\mu A$	
Supply current (LCD Driver)	$I_{DD}$ ( $V_{DD}-V_{SS}=3.0V$ )	-	-	500	$\mu A$	
Supply current (LED)	$I_{LED}$	-	-	90	mA	
Supply Voltage (LED)	$V_{LCD}$	-	5.0	-	V	

## 6.2 Interface Signals

Pin No.	Symbol	Level	Description
1	NC	-	No connection
2	/CS1	H/L	Chip select input pin (active at low)
3	/RES	H/L	Reset input pin (active at low)
4	A0	H/L	Register select input pin (H: Data, L: control)
5	/WR	H/L	Write enable clock input pin
6	/RD	H/L	Read enable clock input pin
7	DB0	H/L	8-bit bi-directional data bus that is connected to the standard 8-bit microprocessor data bus.
8	DB1	H/L	
9	DB2	H/L	
10	DB3	H/L	
11	DB4	H/L	
12	DB5	H/L	
13	DB6	H/L	
14	DB7	H/L	
15	VDD	5.0V	Power supply
16	VSS	0V	Ground
17	VOOUT	-	Voltage converter input / output pin
18	C3-	-	Capacitor connection pin for voltage converter
19	C1+	-	
20	C1-	-	
21	C2+	-	
22	C2-	-	
23	V1	-	LCD driver supply voltages $V1 = (1/7) \times V5$ $V2 = (2/7) \times V5$ $V3 = (5/7) \times V5$ $V4 = (6/7) \times V5$
24	V2	-	
25	V3	-	
26	V4	-	
27	V5	-	
28	VR	-	Output voltage regulator terminal
29	C86	H/L	MPU interface switch terminal (H: 6800 Series MPU interface. L: 8080 MPU interface)
30	IRS	H/L	Terminal selects the resistors for the V5 voltage level adjustment

### 6.3 Interface Timing Chart

#### (1) System Bus Read/Write Characteristics 1 (For the 8080 Series MPU)



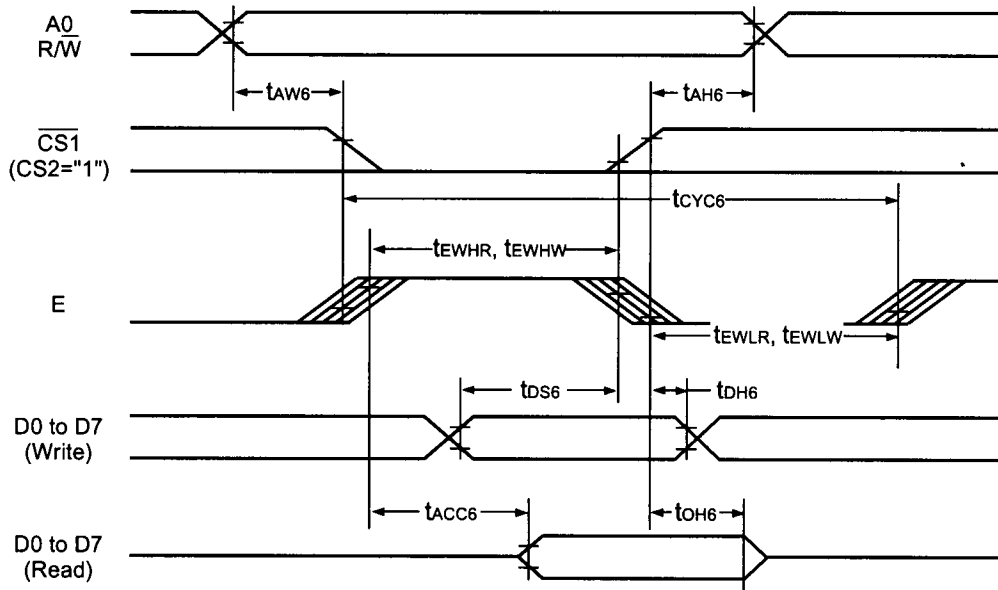
Figure

Table

(VDD = 4.5 V to 5.5 V, Ta = -40 to 85°C)

Item	Signal	Symbol	Condition	Rating		Units
				Min.	Max.	
Address hold time	A0	tAH8		0	—	ns
Address setup time	A0	tAW8		0	—	ns
System cycle time	A0	tCYC8		166	—	ns
Control LOW pulse width ( $\overline{WR}$ )	$\overline{WR}$	tcCLW		30	—	ns
Control LOW pulse width ( $\overline{RD}$ )	$\overline{RD}$	tcCLR		70	—	ns
Control HIGH pulse width ( $\overline{WR}$ )	$\overline{WR}$	tcCHW		30	—	ns
Control HIGH pulse width ( $\overline{RD}$ )	$\overline{RD}$	tcCHR		30	—	ns
Data setup time	D0 to D7	tDS8		30	—	ns
Address hold time		tDH8		10	—	ns
$\overline{RD}$ access time		tACC8	CL = 100 pF	—	70	ns
Output disable time		tOH8		5	50	ns

**(2) System Bus Read/Write Characteristics 2 (6800 Series MPU)**



Figure

Table

( $V_{DD} = 4.5 \text{ V to } 5.5 \text{ V}$ ,  $T_a = -40 \text{ to } 85^\circ\text{C}$ )

Item	Signal	Symbol	Condition	Rating		Units
				Min.	Max.	
Address hold time	A0	tAH6		0	—	ns
Address setup time	A0	tAW6		0	—	ns
System cycle time	A0	tCYC6		166	—	ns
Data setup time	D0 to D7	tDS6		30	—	ns
Data hold time		tDH6		10	—	ns
Access time		tACC6	CL = 100 pF	—	70	ns
Output disable time		tOH6		10	50	ns
Enable HIGH pulse time	Read	E	tEWHR	70	—	ns
	Write	E	tEWHW	30	—	ns
Enable LOW pulse time	Read	E	tEWLR	30	—	ns
	Write	E	tEWLW	30	—	ns

## 6.4 Instruction code

Table of SED1565 Series Commands

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	LCD display ON/OFF 0: OFF, 1: ON
(2) Display start line set	0	1	0	0	1	Display start address						1	Sets the display RAM display start line address
(3) Page address set	0	1	0	1	0	1	1	Page address					Sets the display RAM page address
(4) Column address set upper bit	0	1	0	0	0	0	1	Most significant column address					Sets the most significant 4 bits of the display RAM column address. Sets the least significant 4 bits of the display RAM 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	0	Reads the status data
(6) Display data write	1	1	0	Write data								0	Writes to the display RAM
(7) Display data read	1	0	1	Read data								0	Reads from the display RAM
(8) ADC select	0	1	0	1	0	1	0	0	0	0	0	1	Sets the display RAM address SEG output correspondence 0: normal, 1: reverse
(9) Display normal/reverse	0	1	0	1	0	1	0	0	1	1	0	1	Sets the LCD display normal/reverse 0: normal, 1: reverse
(10) Display all points ON/OFF	0	1	0	1	0	1	0	0	1	0	0	1	Display all points 0: normal display 1: all points ON
(11) LCD bias set	0	1	0	1	0	1	0	0	0	1	0	1	Sets the LCD drive voltage bias ratio SED1565** ..... 0: 1/9, 1: 1/7 SED1566** /SED1568** ..... 0: 1/8, 1: 1/6 SED1567** ..... 0: 1/6, 1: 1/5
(12) Read/modify/write	0	1	0	1	1	1	0	0	0	0	0	0	Column address increment At write: +1 At read: 0
(13) End	0	1	0	1	1	1	0	1	1	1	0	0	Clear read/modify/write
(14) Reset	0	1	0	1	1	1	0	0	0	1	0	0	Internal reset
(15) Common output mode select	0	1	0	1	1	0	0	0	*	*	*	1	Select COM output scan direction 0: normal direction, 1: reverse direction
(16) Power control set	0	1	0	0	0	1	0	1	Operating mode			0	Select internal power supply operating mode
(17) V <sub>s</sub> voltage regulator internal resistor ratio set	0	1	0	0	0	1	0	0	Resistor ratio			0	Select internal resistor ratio (R <sub>b</sub> /R <sub>a</sub> ) mode
(18) Electronic volume mode set	0	1	0	1	0	0	0	0	0	0	0	1	Set the V <sub>s</sub> output voltage electronic volume register
Electronic volume register set	0	1	0	*	*	Electronic volume value							
(19) Static indicator ON/OFF	0	1	0	1	0	1	0	1	1	0	0	1	0: OFF, 1: ON
Static indicator register set	0	1	0	*	*	*	*	*	*	Mode			Set the flashing mode
(20) Power saver													Display OFF and display all points ON compound command
(21) NOP	0	1	0	1	1	1	0	0	0	1	1	1	Command for non-operation
(22) Test	0	1	0	1	1	1	1	*	*	*	*	*	Command for IC test. Do not use this command