

# FindLCD

TF4-8B VER:00

## Specification For Approval

Customer Approval: \_\_\_\_\_ Date: \_\_\_\_\_

Prepared: \_\_\_\_\_ Check: \_\_\_\_\_ Approval: \_\_\_\_\_

Date: \_\_\_\_\_ Date: \_\_\_\_\_ Date: \_\_\_\_\_

**Description**

<b>REV.</b>	<b>DESCREPTION</b>	<b>DATE</b>
V00	First issue	Sep-04-2007

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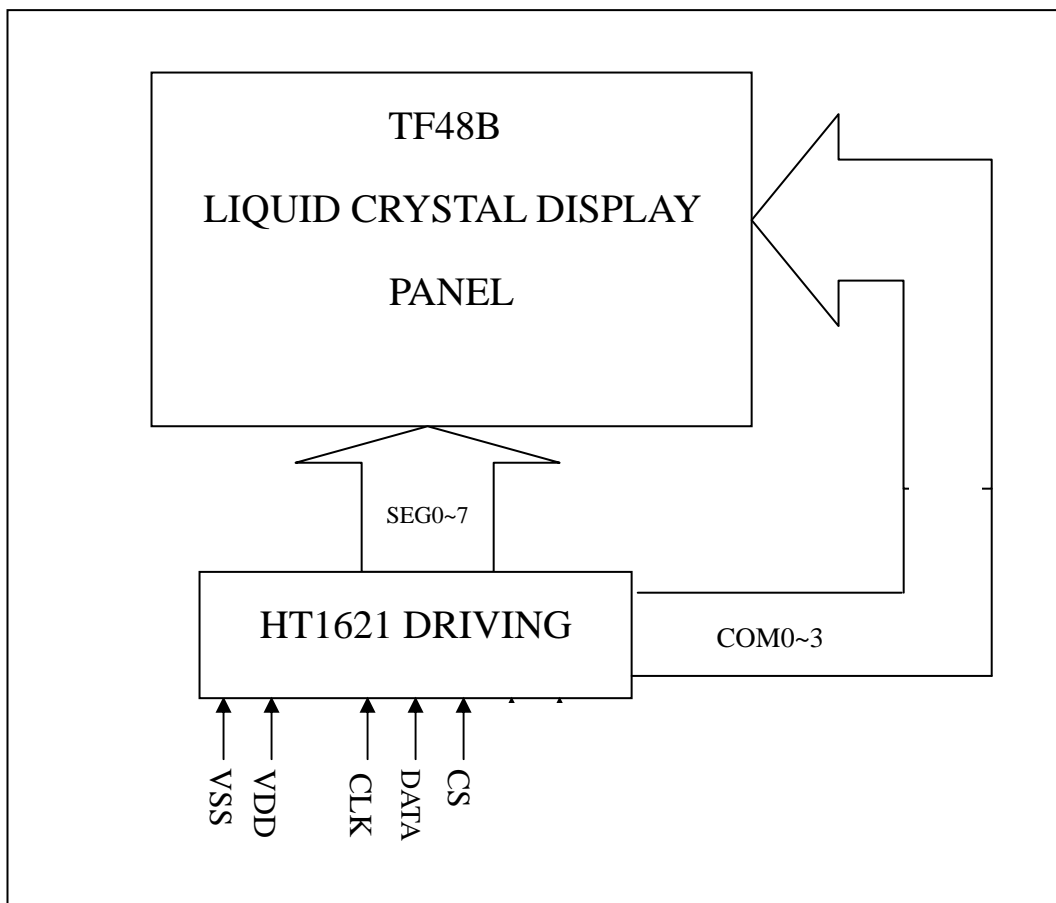
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# 1 . SPECIFICATIONS

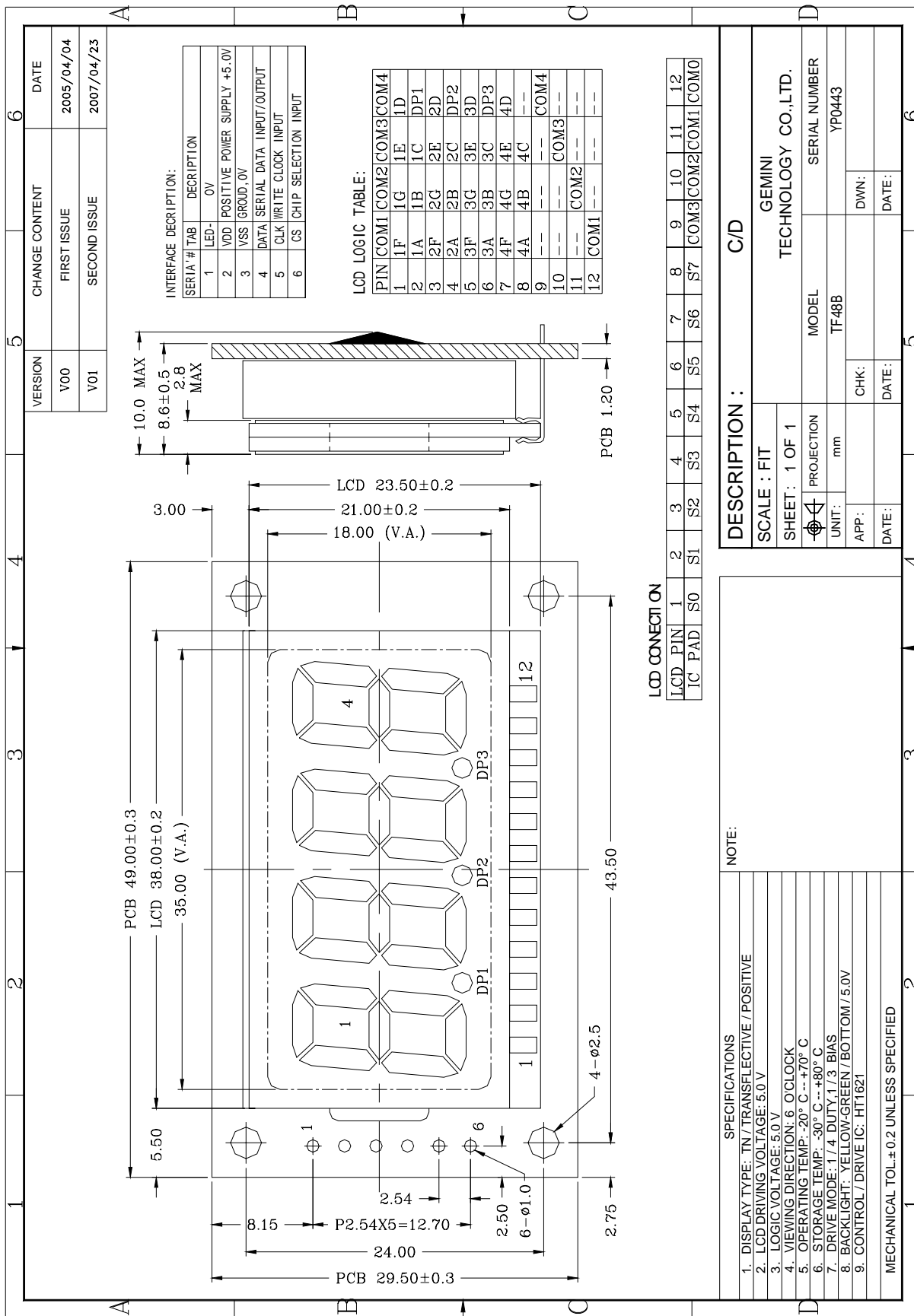
## 1.1 FEATURES

Item	Contents	Unit
LCD type	TN / Transflective / Positive	--
LCD duty	1/4	--
LCD bias	1/3	--
Viewing direction	6	o'clock
Module size(W x H x T)	49.0 X 29.5 X 10.0	mm
Viewing area(W x H)	35.0 X 18.0	mm

## 1.2. BLOCK DIAGRAM



1.3. MECHANICAL SPECIFICATION



### 1.4 ABSOLUTE MAXIMUM RATINGS ( Ta = 25 )

Unless otherwise specified, Vss = 0V

Parameter	Symbol	Min	Max	Unit
Supply voltage for logic	V <sub>DD</sub>	-0.3	5.5	V
Supply voltage for LCD	V <sub>lcd</sub>	0.3	5.5	V
Normal Operating temperature	T <sub>OP</sub>	-20	+70	
Normal Storage temperature	T <sub>ST</sub>	-30	+80	

### 1.5 DC ELECTRICAL CHARACTERISTIC

Unless otherwise specified, Vss = 0V, VDD = 5.0V

Parameter	Symbol	Condition	Min	Type	Max	Unit
Supply voltage for logic	V <sub>DD</sub>	--	4.8	5.0	5.2	V
Supply current for logic	I <sub>DD</sub>	--	--	--	1.5	mA
Operating voltage for LCD	V <sub>0</sub>	25	4.8	5.0	5.2	V
Input voltage "H" level	V <sub>IH</sub>	--	0.8 V <sub>DD</sub>	--	V <sub>DD</sub>	V
Input voltage "L" level	V <sub>IL</sub>	--	0	--	0.2 V <sub>DD</sub>	V

### 1.6 AC CHARACTERISTIC

#### Serial Interface System

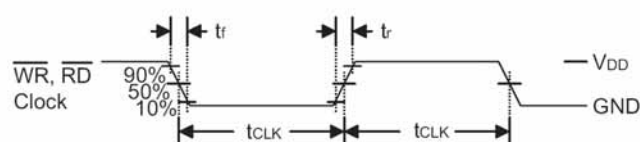


Figure 1

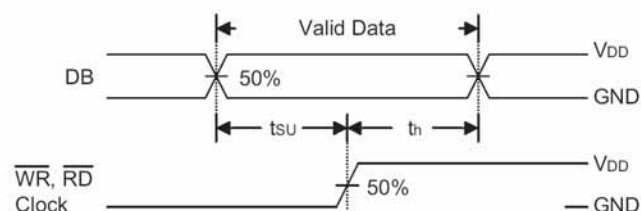
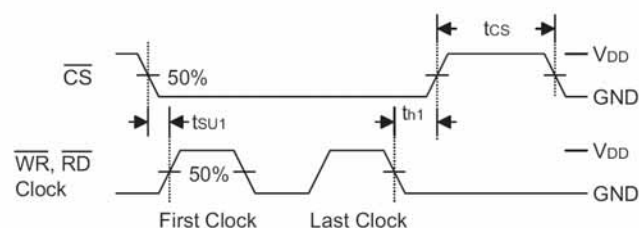


Figure 2

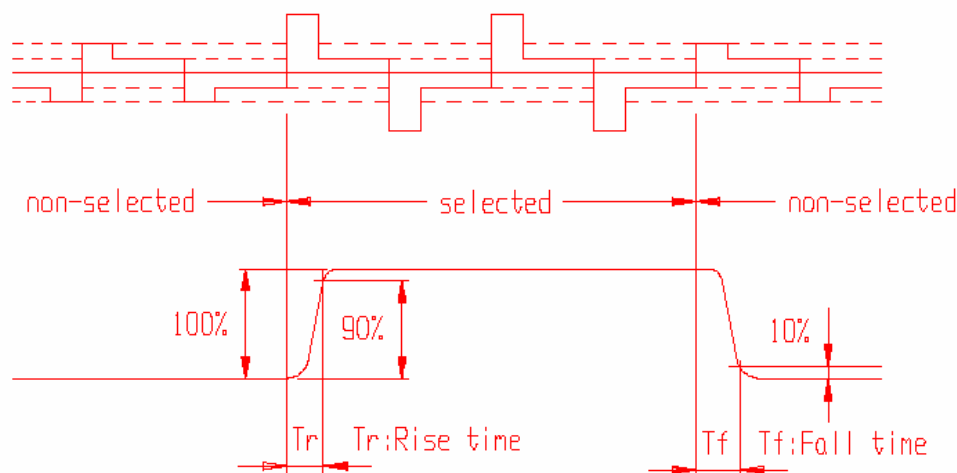


Unless otherwise specified, Vss = 0V, VDD = 5.0V

Parameter	Symbol	Condition	Min	Type	Max	Unit
System Clock	fsys1	On-chip RC oscillator	--	256	--	KHz
LCD Clock	Flcd	On-chip RC oscillator	--	fsys1/1024	--	Hz
Serial Interface Reset Pulse Width	Tcs	CS	--	250	--	ns
WR, RD Input Pulse Width	tclk	Write mode	2.0	--	--	us
		Read mode	4.0	--	--	us

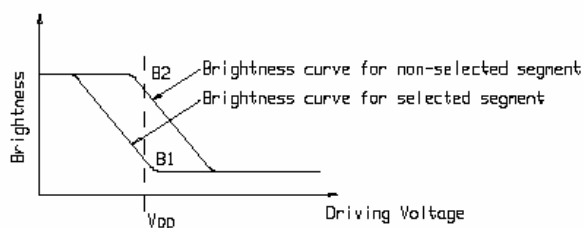
## 1.7 ELECTRO-OPTICAL CHARACTERISTICS

Note1: Definition of response time.

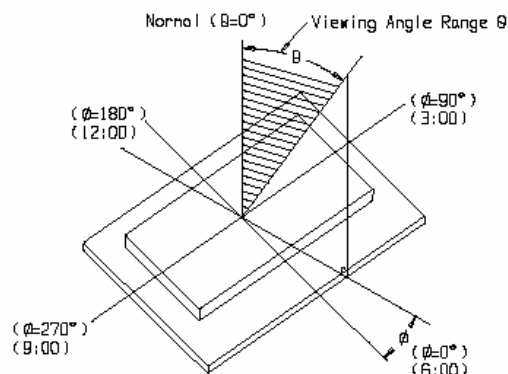


Note2: Definition of contrast ratio 'Cr' .

$$Cr = \frac{\text{Brightness of non-selected segment}(B2)}{\text{Brightness of selected segment}(B1)}$$



Note3: Definition of viewing angle range 'θ'.



## 1.8 BACKLIGHT CHARACTERISTICS

### 1.8.1 ABSOLUTE MAXIMUM RATINGS(Ta=25 )

Item	Symbol	Conditions	Rating	Unit
Absolute maximum forward current	Ifm		140	mA
Reverse voltage	Vr		10	V
Reverse current	Ir		200	uA
Power dissipation	Pd		600	mW
Operating Temperature Range	TOPr		-20~+70	
Storage Temperature Range	Tstg		-30~+80	

### 1.8.2 ELECTRICAL –OPTICAL CHARACTERISTICS(Ta=25 )

COLOR	Operating Voltage( ± 0.2V)	Forward Current (mA)
Yellow-Green	4.2	70

## 2. MODULE STRUCTURE

### 2.1 INTERFACE PIN DESCRIPTION

PIN NO.	Symbol	Level	Description
1	LED-	0V	The backlight ground.
2	VDD	+5.0V	Power supply for logic operating.
3	VSS	0V	Ground
4	DATA	H/L	This is a serial data.
5	CLK	H/L	Write signal.Data on the DATA line is latched into the HT1621 on the rising edge of the WR signal.
6	CS	H/L	This is the chip select signal. When /CS1 = L, then the chip select becomes active.

### 2.2 COMMAND TABLE

Name	ID	Command Code	D/C	Function
READ	1 1 0	A5A4A3A2A1A0D0D1D2D3	D	Read data from the RAM
WRITE	1 0 1	A5A4A3A2A1A0D0D1D2D3	D	READ and WRITE to the RAM
READ-MODIFYWRIT	101	A5A4A3A2A1A0D0D1D2D	D	READ and WRITE to the RAM
SYS DIS	1 0 0	0000-0000-X	C	Turn off both system oscillator and LCD bias generator
LCD OFF	1 0 0	0000-0010-X	C	Turn off LCD bias generator
LCD ON	1 0 0	0000-0011-X	C	Turn on LCD bias generator
TIMER DIS	1 0 0	0000-0100-X	C	Disable time base output
RC 256K	1 0 0	0001-10XX-X	C	System clock source, on-chip RC oscillator
BIAS 1/2	1 0 0	0010-abX0-X	C	LCD 1/2 bias option ab=00: 2 commons option ab=01: 3 commons option ab=10: 4 commons option
BIAS 1/3	1 0 0	0010-abX1-X	C	LCD 1/3 bias option ab=00: 2 commons option ab=01: 3 commons option ab=10: 4 commons option

Note: X : Don,t care

A5~A0 : RAM addresses

D3~D0 : RAM data

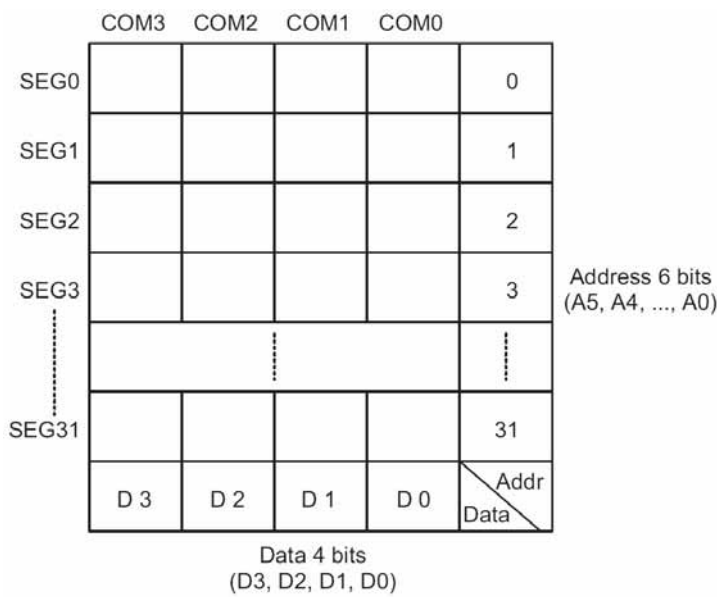
D/C : Data/command mode



## 2.3. Functional Description

### 2.3.1 Display Memory RAM

The static display memory (RAM) is organized into 32\*4 bits and stores the displayed data. The contents of the RAM are directly mapped to the contents of the LCD driver. Data in the RAM can be accessed by the READ, WRITE, and READ-MODIFY-WRITE commands. The following is a mapping from the RAM to the LCD pattern:



**RAM Mapping**

### 2.3.2 Command Format

The HT1621 can be configured by the S/W setting. There are two mode commands to configure the HT1621 resources and to transfer the LCD display data. The configuration mode of the HT1621 is called command mode, and its command mode ID is 1 0 0. The command mode consists of a system configuration command, a system frequency selection

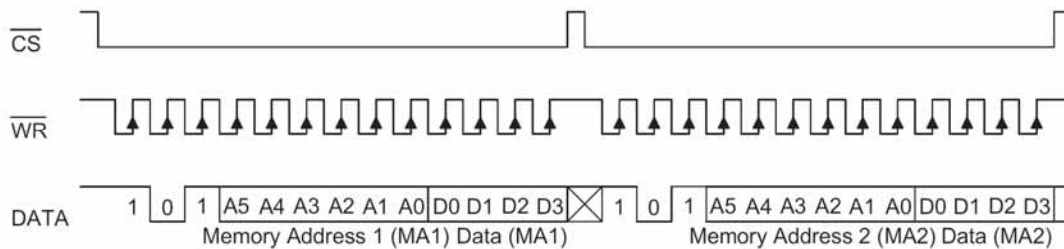
command, a LCD configuration command, a tone frequency selection command, a timer/WDT setting command, and an operating command. The data mode, on the other hand, includes READ, WRITE, and READ-MODIFY-WRITE operations. The following are the data mode IDs and the command mode ID.

The mode command should be issued before the data or command is transferred. If successive commands have been issued, the command mode ID, namely 1 0 0, can be omitted. While the system is operating in the non-successive command or the non-successive address data mode, the CS pin should be set to 1 and the previous operation mode will be reset also. Once the CS pin returns to 0 a new operation mode ID should be issued first.

Operation	Mode	ID
Read	Data	1 1 0
Write	Data	1 0 1
Read-Modify-Write	Data	1 0 1
Command	Command	1 0 0

### 2.3.3 Timing Diagrams

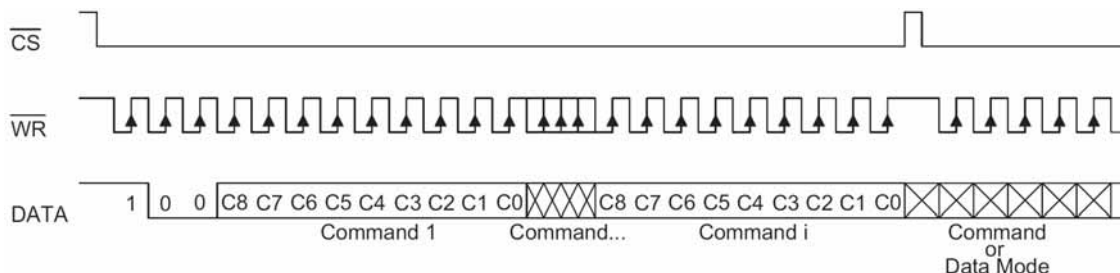
#### WRITE Mode (Command Code : 1 0 1)



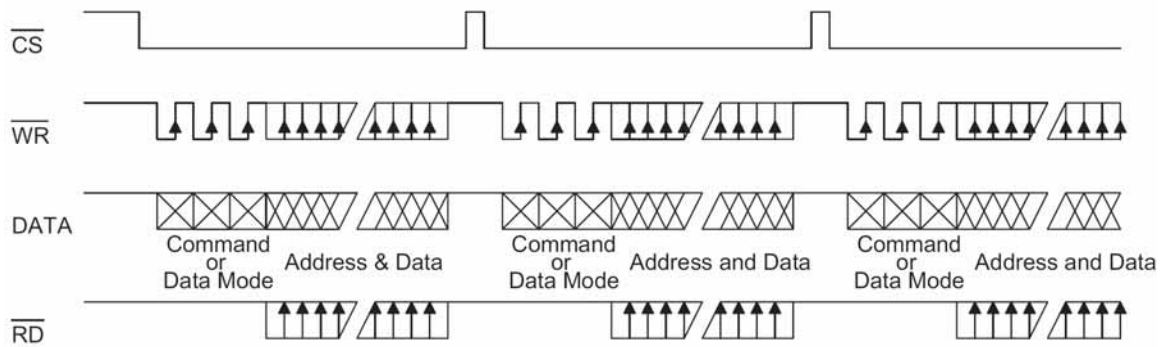
#### WRITE Mode (Successive Address Writing)



#### Command Mode (Command Code : 1 0 0)

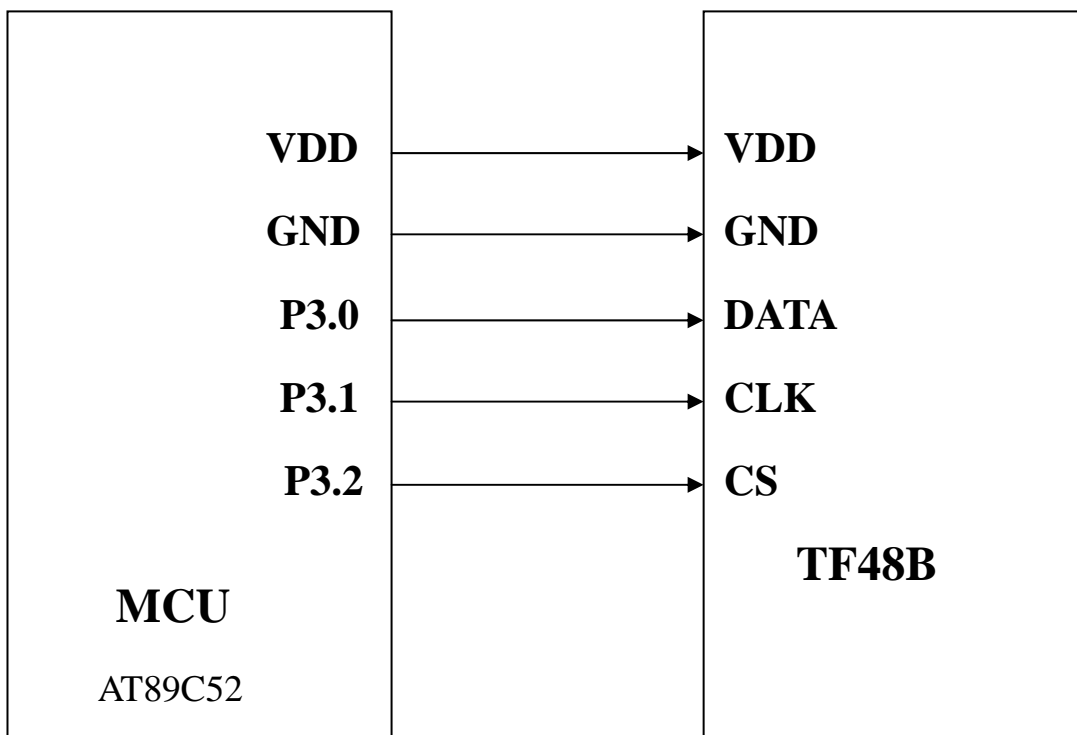


**Mode (Data And Command Mode)**



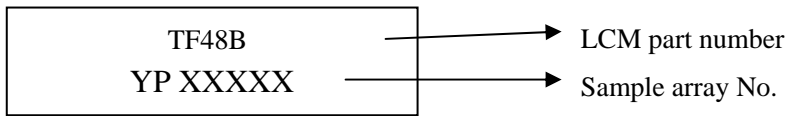
**2.4. MCU AND MODULE CONNECTION**

**The MCU interface**



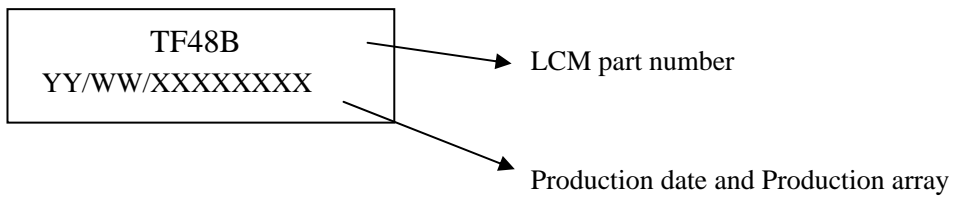
### **3. DATE CODE RULES**

#### **3-1. DATE CODE FOR SAMPLE**



YP: meaning sample

#### **3-2. DATE CODE FOR PRODUCTION**



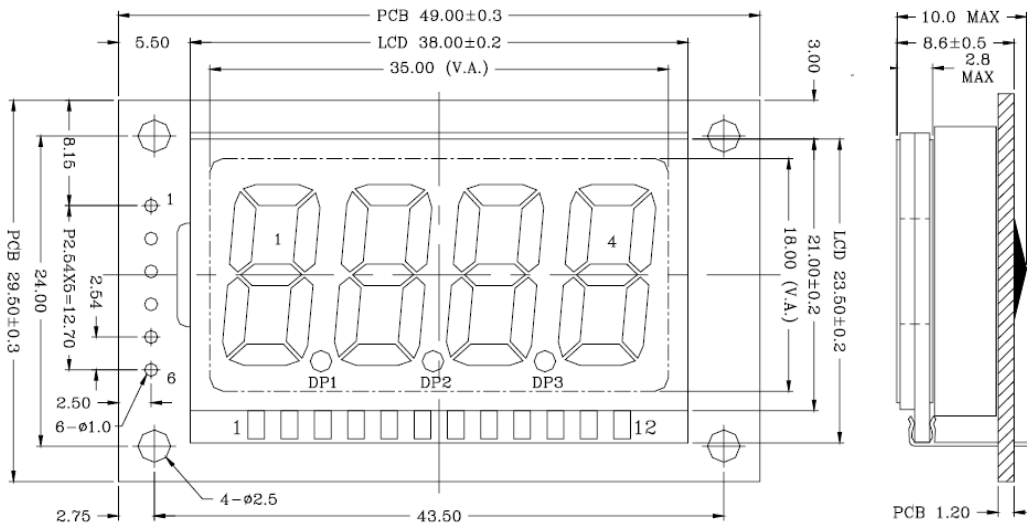
A. TF4-8B represents LCM part number

C. YY/WW represents Year, Week

YY—Year      WW—Week

XXXXXXXX—Production array No.

\*\*\*END\*\*\*



INTERFACE DESCRIPTION:

SERIA' #	TAB	DESCRIPTION
1	LED-	0V
2	VDD	POSITIVE POWER SUPPLY +5.0V
3	VSS	GROUD, 0V
4	DATA	SERIAL DATA INPUT/OUTPUT
5	CLK	WRITE CLOCK INPUT
6	CS	CHIP SELECTION INPUT

LCD LOGIC TABLE:

PIN	COM1	COM2	COM3	COM4
1	1F	1G	1E	1D
2	1A	1B	1C	DP1
3	2F	2G	2E	2D
4	2A	2B	2C	DP2
5	3F	3G	3E	3D
6	3A	3B	3C	DP3
7	4F	4G	4E	4D
8	4A	4B	4C	--
9	--	--	--	COM4
10	--	--	COM3	--
11	--	COM2	--	--
12	COM1	--	--	--

LCD CONNECTION:

LCD PIN	1	2	3	4	5	6	7	8	9	10	11	12
IC PAD	S0	S1	S2	S3	S4	S5	S6	S7	COM3	COM2	COM1	COM0

SPECIFICATIONS

1. DISPLAY TYPE: TN / TRANSFLECTIVE / POSITIVE
2. LCD DRIVING VOLTAGE: 5.0 V
3. LOGIC VOLTAGE: 5.0 V
4. VIEWING DIRECTION: 6 O'CLOCK
5. OPERATING TEMP: -20° C -- +70° C
6. STORAGE TEMP: -30° C -- +80° C
7. DRIVE MODE: 1/4 DUTY, 1/3 BIAS
8. BACKLIGHT: YELLOW-GREEN / BOTTOM / 5.0V
9. CONTROL / DRIVE IC: HT1621

MECHANICAL TOL ±0.2 UNLESS SPECIFIED

```

int main(void)
{
uchar a[10];
a[0]=0xFF;a[1]=0xff;a[2]=0xff;a[3]=0xff;
/*****/
// dp c b a--d e g f
// 0 0 0 0--0 0 0 0
/*****/
Stm32_Clock_Init(9);           //
delay_init(72);               //
LED_Init();
init_port();                  //
SendCmd(BIAS);                //
SendCmd(SYSEN);               //
SendCmd(LCDON);               //
Write_1621(0x09,0x01);        //
WriteAll_1621(0,a,5);         //
while(1) {
LED0=0;
LED1=1;
delay_ms(300);
LED0=1;
LED1=0;
delay_ms(300);
}
}

```