BH series LCD driver user's guide

Feature

This user's guide is mainly for LCD Driver of BH67F2472

- LCD driver function
  - SEG × COM: 36×4，34×6 or 32×8 Accuracy : ± 3% RH
  - Duty cycle type: 1/4 Duty，1/6 Duty or 1/8 Duty
  - Bias voltage level: 1/3 bias
  - Bias type: C type
  - Waveform type: A type or B type

LCD driver

It's a cost-effective option to choose custom LCD in mass production.
To drive custom displays requires COM and SEG signals of variable amplitude and time, and many special considerations to operate the LCD properly.
The BH67F2472 has a built-in LCD signal generation circuit and a variety of options, which can automatically generate signals with variable time and amplitude to directly drive the LCD, and it is also quite easy to connect with the user's LCD interface.

驱动数目	占空比	偏压	偏压类型	波形类型
36×4	1/4	1/3	C	A 或 B
34×6	1/6	1/3	C	A 或 B
32×8	1/8	1/3	C	A 或 B

LCD 驱动器输出选项

LCD display data register

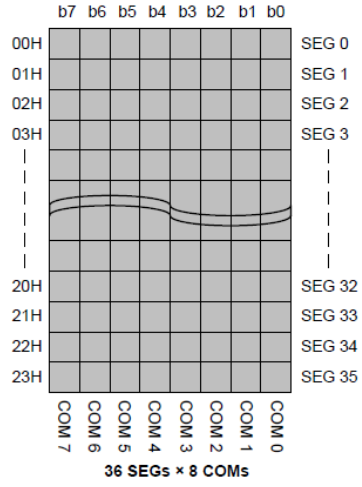
A part of the data memory is specially reserved for storing LCD display data, that is, the display storage area. The internal display drive circuit of the BH67F2472 will automatically read any data written here and generate LCD drive signals accordingly.
Therefore, any data written to the LCD memory will be immediately mapped to the LCD display connected to the BH67F2472.

The BH67F2472 provides an embedded data storage area for LCD display. This area is located at 00H~23H of Sector 4. If you use indirect addressing mode to access the LCD memory, you need to set the value of MP1H or MP2H to "04H" and select the operation for Sector 4. And you can use the indirect addressing mode to operate the memory area through MP1L or MP2L.

After selecting Sector 4, use MP1L or MP2L to operate on the memory area whose address range is 00H~23H, and then you can read or write the display memory area. The LCD data storage area in Sector 4 can also be directly addressed using extended instructions.

When data is written into the display data area, these data are automatically read by the LCD driver to generate corresponding LCD driving signals. Write "1" or "0" into the corresponding bit of the display memory, you can command it to display or not display. The LCD memory map below shows how the internal LCD memory is mapped to the SEG and COM pins.
Please note that the unused LCD RAM cannot be used as general-purpose data memory. For example,

if the LCD has a 1/4 duty cycle, then COM4~COM5 can only be read as "0".



LCD 存储器映射图

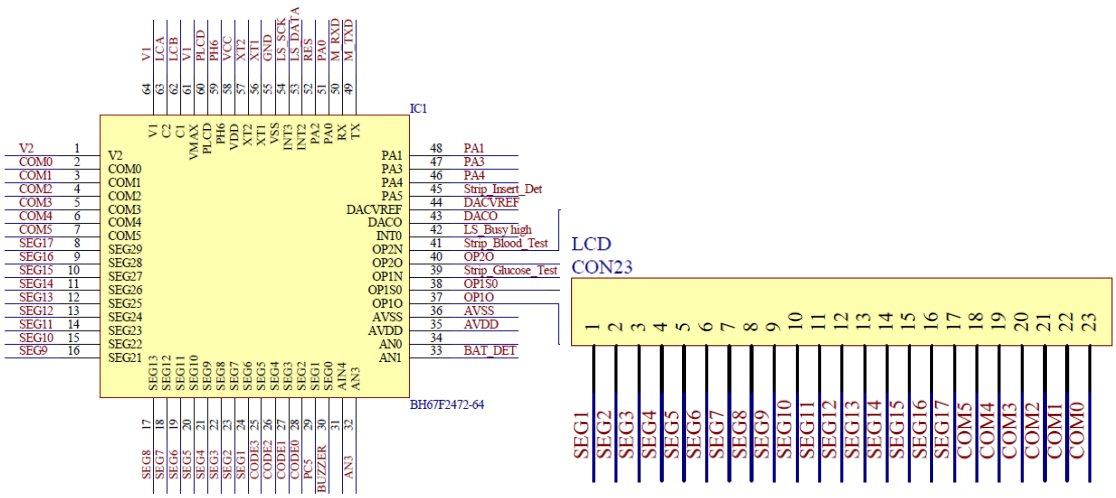
Please refer to the datesheet for more details. The following is an LCD driver example.

Getting Started

Hardware

It's an example of 6COM X 17SEG LCD as below. The SEG1~SEG8 of the LCD of the LCD are connected to the SEG6~SEG13 pins of the BH67F2472 respectively, and the SEG9~SEG17 of the LCD are respectively connected to On SEG21~SEG29 of BH67F2472, the drive is based on the memory address of BH67F2472 in the last century.

If you want to light up the content of SEG1 of LCD, you need to operate SEG6 of BH67F2472.



LCD Ture Value Table

PIN	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
COM1	P7	P4	P1	P8	P5	P2	P3	13D	12D	11C	11D	10D	9C	9D	8D	6D	5BC	COM1					
COM2	1A	2A	3F	3A	4F	P9	P6	13E	12C	11B	11E	10C	9B	9E	8C	6C	6E		COM2				
COM3	1F	2F	2B	3B	4G	4A	13C	13G	12G	DOT2	11G	10G	P20	9G	8G	7G	6G			COM3			
COM4	1G	1B	2G	3G	4E	4B	13B	13F	12B	12E	11F	10B	10E	9F	8B	8E	6B				COM4		
COM5	1E	2E	2C	3E	3C	4C	P19	13A	12A	12F	11A	10A	10F	9A	8A	8F	6F					COM5	
COM6	1D	1C	2D	3D	DOT1	4D	P18	P17	P16	P15	P14	P13	P12	P11	P10		6A						COM6

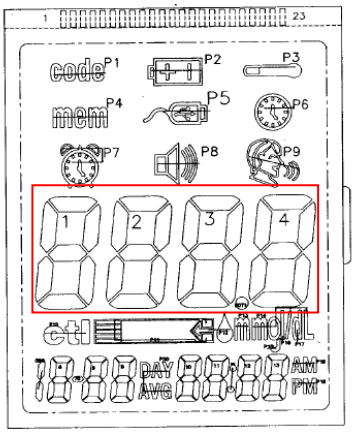
From the above figure, COM1 of LCD is connected to COM5 of BH67F2472, COM2 is connected to COM4 of BH67F2472, COM3 is connected to COM3 of BH67F2472, COM4 is connected to COM2 of BH67F2472, COM5 is connected to COM1 of BH67F2472, and COM6 is connected to COM0 of BH67F2472.
Comparing the LCD break code table with the hardware connection diagram, you can get the data as below:

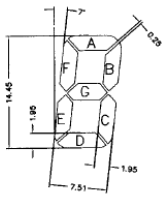
	SEG6	SEG7	SEG8	SEG9	SEG10	SEG11	SEG12	SEG13	SEG21	SEG22	SEG23	SEG24	SEG25	SEG26	SEG27	SEG28	SEG28	COM5	COM4	COM3	COM2	COM1	COM0
COM5																							
COM4																							
COM3																							
COM2																							
COM1																							
COM0																							

PIN	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
COM1	P7	P4	P1	P8	P5	P2	P3	13D	12D	11C	11D	10D	9C	9D	8D	6D	5BC	COM1					
COM2	1A	2A	3F	3A	4F	P9	P6	13E	12C	11B	11E	10C	9B	9E	8C	6C	6E		COM2				
COM3	1F	2F	2B	3B	4G	4A	13C	13G	12G	DOT2	11G	10G	P20	9G	8G	7G	6G			COM3			
COM4	1G	1B	2G	3G	4E	4B	13B	13F	12B	12E	11F	10B	10E	9F	8B	8E	6B				COM4		
COM5	1E	2E	2C	3E	3C	4C	P19	13A	12A	12F	11A	10A	10F	9A	8A	8F	6F					COM5	
COM6	1D	1C	2D	3D	DOT1	4D	P18	P17	P16	P15	P14	P13	P12	P11	P10		6A						COM6

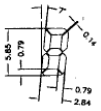
The red font marks the BH67F2472 pin, and from the LCD storage map above, it can be seen that "P7" needs to be written to SEG6 of BH67F2472. 0b0010000 (b5 is 1).

LCD Segment





1–4



5–13

Software

If you want to light up the digital tube in the red box in the above picture, you need to query the PIN corresponding to No. 1 digital tube in the true value table. The segment is connected to SEG6, SEG7, SEG8 of BH67F2472 , SEG9, SEG10, SEG11, if you want to display a group of numbers "1234" in this position, please refer to the following software settings.
First, use the function to pass "1234" for data separation, and then convert it into BCD code.

Function	fun_BIN_TO_BCD(u8 lu8v_dis_mode,u16 lu16v_data)			
Formal parameter	lu8v_dis_mode	LBC_SET	lu16c_Hypotension	1234

1. Display the function after converting the separated data into BCD code

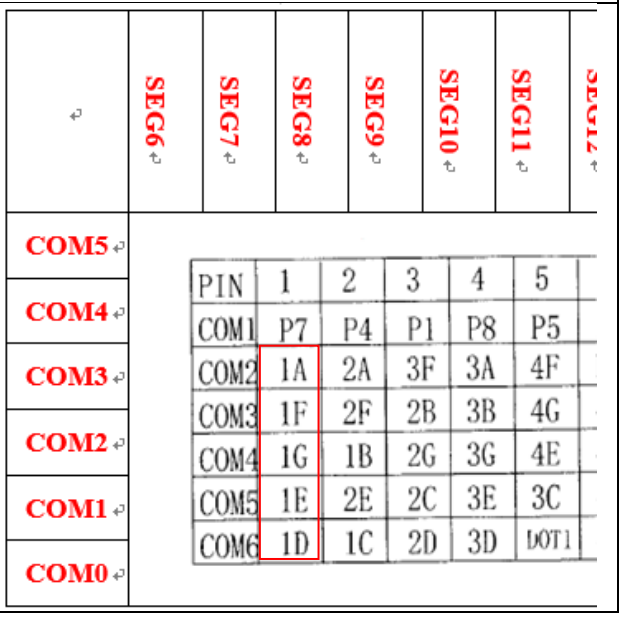
Function	LCD_DISP_GLUCOSE()			
Formal parameter				

We've attached the souce code for your reference.

Display 1

```
//bank4 LCD map
_mp1h = 4;
_mp1l = 6;  //對應SEG6

SFR_iar1.u8 &= 0b11100000;  //
if(gu8a_BCD[3].bits.SEG_A)
{
    SFR_iar1.bits.b4 = 1;
}
if(gu8a_BCD[3].bits.SEG_F)
{
    SFR_iar1.bits.b3 = 1;
}
if(gu8a_BCD[3].bits.SEG_G)
{
    SFR_iar1.bits.b2 = 1;
}
if(gu8a_BCD[3].bits.SEG_E)
{
    SFR_iar1.bits.b1 = 1;
}
if(gu8a_BCD[3].bits.SEG_D)
{
    SFR_iar1.bits.b0 = 1;
}
```



```
_mp1l ++;   //對應SEG7
SFR_iar1.u8 &= 0b11111010;
if(gu8a_BCD[3].bits.SEG_B)
{
    SFR_iar1.bits.b2 = 1;
}
if(gu8a_BCD[3].bits.SEG_C)
{
    SFR_iar1.bits.b0 = 1;
}
```

	SEG6	SEG7	SEG8	SEG9	SEG10	SEG11	SEG12
COM5							
COM4							
COM3							
COM2							
COM1							
COM0							

PIN	1	2	3	4	5
COM1	P7	P4	P1	P8	P5
COM2	1A	2A	3F	3A	4F
COM3	1F	2F	2B	3B	4G
COM4	1G	1B	2G	3G	4E
COM5	1E	2E	2C	3E	3C
COM6	1D	1C	2D	3D	DOT1

Display 2

```
//SEG7
SFR_iar1.u8 &= 0b11100101;
if(gu8a_BCD[2].bits.SEG_A)
{
    SFR_iar1.bits.b4 = 1;
}
if(gu8a_BCD[2].bits.SEG_F)
{
    SFR_iar1.bits.b3 = 1;
}
if(gu8a_BCD[2].bits.SEG_E)
{
    SFR_iar1.bits.b1 = 1;
}
```

	SEG6	SEG7	SEG8	SEG9	SEG10	SEG11	SEG12
COM5							
COM4							
COM3							
COM2							
COM1							
COM0							

PIN	1	2	3	4	5
COM1	P7	P4	P1	P8	P5
COM2	1A	2A	3F	3A	4F
COM3	1F	2F	2B	3B	4G
COM4	1G	1B	2G	3G	4E
COM5	1E	2E	2C	3E	3C
COM6	1D	1C	2D	3D	DOT1

```
_mp1l ++;   //對應SEG8
SFR_iar1.u8 &= 0b11110000;
if(gu8a_BCD[2].bits.SEG_B)
{
    SFR_iar1.bits.b3 = 1;
}
if(gu8a_BCD[2].bits.SEG_G)
{
    SFR_iar1.bits.b2 = 1;
}
if(gu8a_BCD[2].bits.SEG_C)
{
    SFR_iar1.bits.b1 = 1;
}
if(gu8a_BCD[2].bits.SEG_D)
{
    SFR_iar1.bits.b0 = 1;
}
```

	SEG6	SEG7	SEG8	SEG9	SEG10	SEG11	SEG12
COM5							
COM4							
COM3							
COM2							
COM1							
COM0							

PIN	1	2	3	4	5
COM1	P7	P4	P1	P8	P5
COM2	1A	2A	3F	3A	4F
COM3	1F	2F	2B	3B	4G
COM4	1G	1B	2G	3G	4E
COM5	1E	2E	2C	3E	3C
COM6	1D	1C	2D	3D	DOT1

Display 3

```
//SEG8
SFR_iar1.u8 &= 0b11101111;
if(gu8a_BCD[1].bits.SEG_F)
{
    SFR_iar1.bits.b4 = 1;
}
```

	SEG6	SEG7	SEG8	SEG9	SEG10	SEG11	SEG12
COM5							
COM4							
COM3							
COM2							
COM1							
COM0							

PIN	1	2	3	4	5
COM1	P7	P4	P1	P8	P5
COM2	1A	2A	3F	3A	4F
COM3	1F	2F	2B	3B	4G
COM4	1G	1B	2G	3G	4E
COM5	1E	2E	2C	3E	3C
COM6	1D	1C	2D	3D	DOT1

```
_mp1l ++;   //對應SEG9
SFR_iar1.u8 &= 0b11100000;
if(gu8a_BCD[1].bits.SEG_A)
{
    SFR_iar1.bits.b4 = 1;
}
if(gu8a_BCD[1].bits.SEG_B)
{
    SFR_iar1.bits.b3 = 1;
}
if(gu8a_BCD[1].bits.SEG_G)
{
    SFR_iar1.bits.b2 = 1;
}
if(gu8a_BCD[1].bits.SEG_E)
{
    SFR_iar1.bits.b1 = 1;
}
if(gu8a_BCD[1].bits.SEG_D)
{
    SFR_iar1.bits.b0 = 1;
}
```

	SEG6	SEG7	SEG8	SEG9	SEG10	SEG11	SEG12
COM5							
COM4							
COM3							
COM2							
COM1							
COM0							

PIN	1	2	3	4	5
COM1	P7	P4	P1	P8	P5
COM2	1A	2A	3F	3A	4F
COM3	1F	2F	2B	3B	4G
COM4	1G	1B	2G	3G	4E
COM5	1E	2E	2C	3E	3C
COM6	1D	1C	2D	3D	DOT1

```
_mp1l ++;   //對應SEG10
SFR_iar1.u8 &= 0b11111101;
if(gu8a_BCD[1].bits.SEG_C)
{
    SFR_iar1.bits.b1 = 1;
}
```

	SEG6	SEG7	SEG8	SEG9	SEG10	SEG11	SEG12
COM5							
COM4							
COM3							
COM2							
COM1							
COM0							

PIN	1	2	3	4	5
COM1	P7	P4	P1	P8	P5
COM2	1A	2A	3F	3A	4F
COM3	1F	2F	2B	3B	4G
COM4	1G	1B	2G	3G	4E
COM5	1E	2E	2C	3E	3C
COM6	1D	1C	2D	3D	DOT1

Display 4

```
//SEG10
SFR_iar1.u8 &= 0b11100011;
if(gu8a_BCD[0].bits.SEG_F)
{
    SFR_iar1.bits.b4 = 1;
}
if(gu8a_BCD[0].bits.SEG_G)
{
    SFR_iar1.bits.b3 = 1;
}
if(gu8a_BCD[0].bits.SEG_E)
{
    SFR_iar1.bits.b2 = 1;
}
```

	SEG6	SEG7	SEG8	SEG9	SEG10	SEG11	SEG12
COM5							
COM4							
COM3							
COM2							
COM1							
COM0							

PIN	1	2	3	4	5
COM1	P7	P4	P1	P8	P5
COM2	1A	2A	3F	3A	4F
COM3	1F	2F	2B	3B	4G
COM4	1G	1B	2G	3G	4E
COM5	1E	2E	2C	3E	3C
COM6	1D	1C	2D	3D	DOT1

```
_mp1l ++;   //對應SEG11
SFR_iar1.u8 &= 0b11110000;
if(gu8a_BCD[0].bits.SEG_A)
{
    SFR_iar1.bits.b3 = 1;
}
if(gu8a_BCD[0].bits.SEG_B)
{
    SFR_iar1.bits.b2 = 1;
}
if(gu8a_BCD[0].bits.SEG_C)
{
    SFR_iar1.bits.b1 = 1;
}
if(gu8a_BCD[0].bits.SEG_D)
{
    SFR_iar1.bits.b0 = 1;
}
```

	SEG6	SEG7	SEG8	SEG9	SEG10	SEG11	SEG12
COM5							
COM4							
COM3							
COM2							
COM1							
COM0							

PIN	1	2	3	4	5	6
COM1	P7	P4	P1	P8	P5	P2
COM2	1A	2A	3F	3A	4F	P9
COM3	1F	2F	2B	3B	4G	4A
COM4	1G	1B	2G	3G	4E	4B
COM5	1E	2E	2C	3E	3C	4C
COM6	1D	1C	2D	3D	DOT1	4D

Therefore, you can use the following function to display 1234:

LCD_DISP_GLUCOSE_ON(LBC_SET, 1234)