Graphic Display Module

Part Number

G240128D-STW-DW65

Overview:

- 240x128 Graphic LCD
- STN Blue Gray Positive
- 144.0x104.0mm Module
- 6800 Parallel Interface
- White LED Backlight

- Transflective
- Wide Temp Range
- 5.0V
- LCD IC: LC7981
- RoHS Compliant

Graphic LCD Features

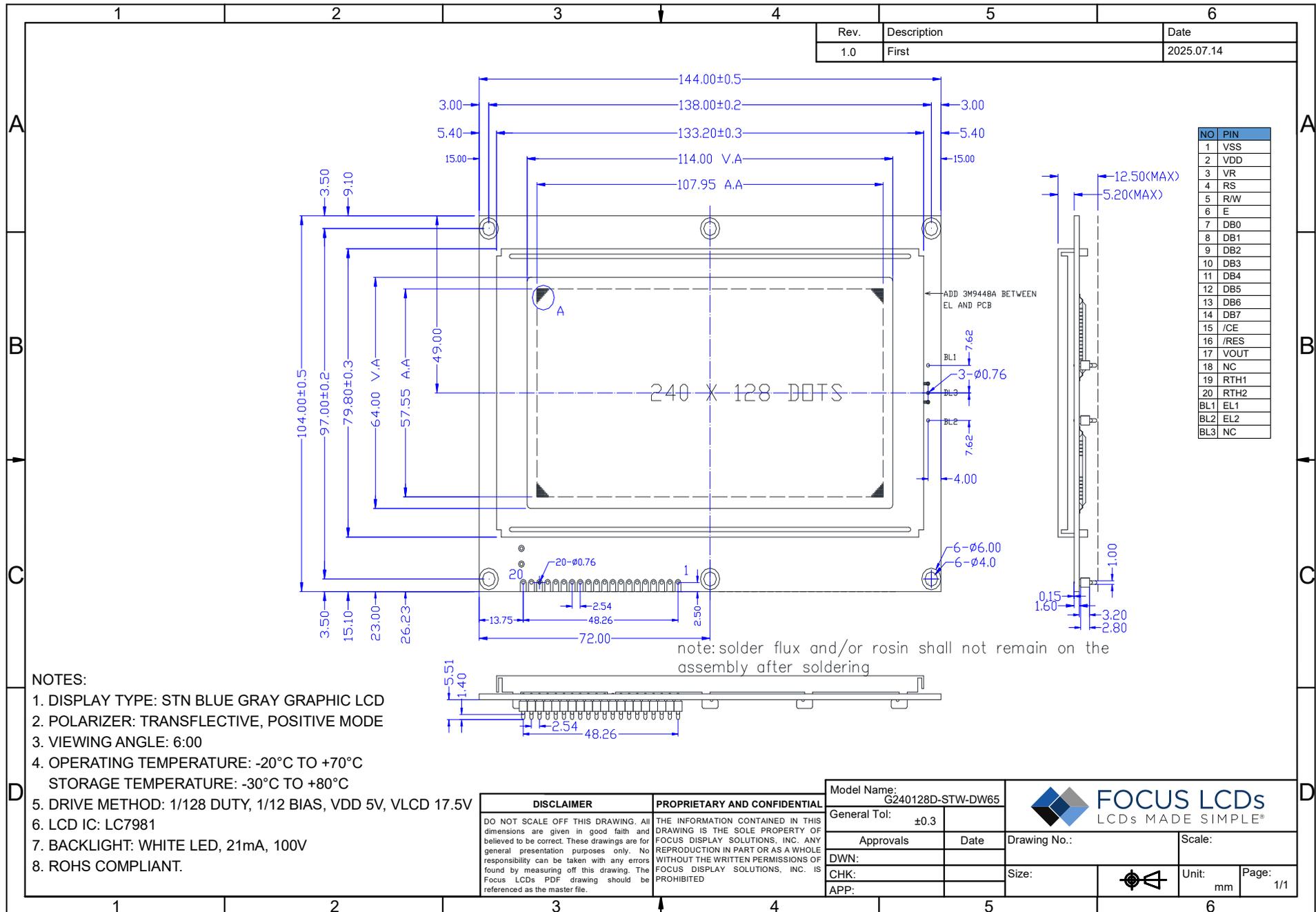Resolution: 240x128 Dots

Interface(s): 6800 Parallel

RoHS Compliant.

General Information Items	Specification	Unit	Note
	Main Panel		
Viewing Area (VA)	114.0 (H) x 64.0 (V)	mm	--
LCD Type	STN Positive	--	--
Viewing Angle	6:00	O'Clock	--
Polarizer	Transflective	--	--
Backlight Type	Side EL	--	--
Backlight Color	White	--	--
LCD IC	LC7981	--	--
Drive Mode	1/128 Duty, 1/12 Bias	--	--
Operating Temperature	-20 to +70	°C	--
Storage Temperature	-30 to +80	°C	--

Mechanical Information

Item		Min.	Typ.	Max.	Unit	Note
Module Size	Horizontal (H)	--	144.00	--	mm	--
	Vertical (V)	--	104.00	--	mm	--
	Depth (D)	--	13.00	--	mm	--
Weight		--	145.80	--	g	Approximate

www.FocusLCDs.com

1. Outline Dimensions

Rev.	Description	Date
1.0	First	2025.07.14

NO	PIN
1	VSS
2	VDD
3	VR
4	RS
5	R/W
6	E
7	DB0
8	DB1
9	DB2
10	DB3
11	DB4
12	DB5
13	DB6
14	DB7
15	/CE
16	/RES
17	VOUT
18	NC
19	RTH1
20	RTH2
BL1	EL1
BL2	EL2
BL3	NC

ADD 3M9448A BETWEEN EL AND PCB

240 X 128 DOTS

note: solder flux and/or rosin shall not remain on the assembly after soldering

NOTES:
1. DISPLAY TYPE: STN BLUE GRAY GRAPHIC LCD
2. POLARIZER: TRANSFLECTIVE, POSITIVE MODE
3. VIEWING ANGLE: 6:00
4. OPERATING TEMPERATURE: -20°C TO +70°C
   STORAGE TEMPERATURE: -30°C TO +80°C
5. DRIVE METHOD: 1/128 DUTY, 1/12 BIAS, VDD 5V, VLCD 17.5V
6. LCD IC: LC7981
7. BACKLIGHT: WHITE LED, 21mA, 100V
8. ROHS COMPLIANT.

Model Name: G240128D-STW-DW65

General Tol: ±0.3

Approvals	Date
DWN:	
CHK:	
APP:	

Drawing No.:

Scale:

Size:

Unit: mm

Page: 1/1

2. Input Terminal Pin Assignment

NO.	Symbol	Description	I/O
1	VSS	Power supply(GND).	P
2	VDD	Power supply for logic(+5.0V).	P
3	VR	LCD contrast adjust.	I
4	RS	Command/Data select signal.	I
5	R/W	Read/Write signal.	I
6	E	Enable signal.	I
7	DB0	Data bus lines.	I/O
8	DB1		
9	DB2		
10	DB3		
11	DB4		
12	DB5		
13	DB6		
14	DB7		
15	/CE	Chip select signal.	I
16	/RES	Reset signal (low effective).	I
17	VOUT	LCD module negative input.	O
18	NC	No connection.	--
19	RTH1	PIN 1 of 10k resistor.	I
20	RTH2	PIN 2 of 10k resistor.	I
BL1	EL1	Power supply for EL backlight.	P
BL2	EL2	Power supply for EL backlight.	P
BL3	NC	No connection.	--

I: Input, O: Output, P: Power

3. LCD Optical Characteristics

Item		Symbol	Condition	Min	Typ.	Max	Unit
Contrast Ratio		CR	--	--	12	--	--
Response Time	On	T_{on}	--	--	160	240	ms
	Off	T_{off}		--	100	150	ms
Viewing Angle $C_r \geq 2$, 25°C	Hor.	Θ_L	Φ=270°, 9H	--	--	60	degree
		Θ_R	Φ=90°, 3H	--	--	60	
	Ver.	Θ_T	Φ=180°, 12H	-40	--	40	
		Θ_B	Φ=0°, 6H	-40	--	40	

4. Electrical Characteristics

4.1 Absolute Maximum Rating

Characteristics	Symbol	Min	Max	Unit
Supply Voltage	VDD	-0.3	7.0	V
	VLCD	0.0	26.0	V
Input Voltage	Vin	-0.3	VDD+0.3	V
Operating Temperature	T_{OP}	-20	+70	°C
Storage Temperature	T_{ST}	-30	+80	°C

NOTE: If the absolute maximum rating of the above parameters is exceeded, even momentarily, the quality of the product may be degraded. Absolute maximum ratings specify the values which the product may be physically damaged if exceeded. Be sure to use the product within the range of the absolute maximum ratings.

4.2 DC Electrical Characteristics

Characteristics		Symbol	Condition	Min	Typ.	Max	Unit
Supply Voltage For Logic		VDD-VSS	--	4.5	5.0	5.5	V
Supply Voltage For LCD		VDD-VR	VDD = 5V	--	17.5	--	V
Input Voltage	H Level	V_{IH}	--	2.2	--	VDD	V
	L Level	V_{IL}	--	0.0	--	0.6	V

Condition:
1. VDD = 5.0V
2. 1/128 Duty, 1/12 Bias

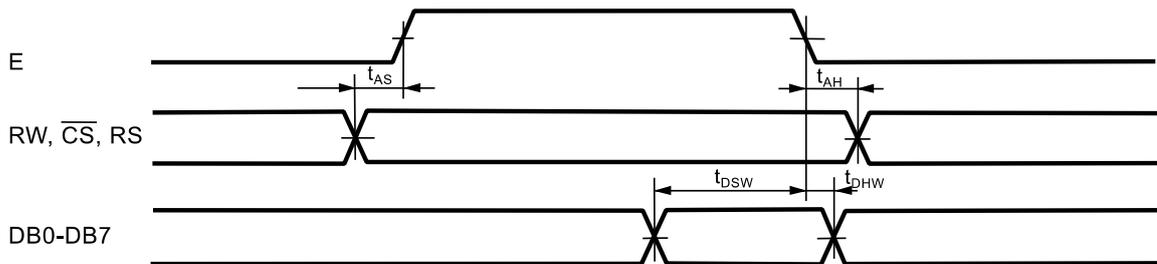# 5. Module Function

5.1   Timing Characteristics

System Bus Timing for 6800 MCU Interface

READ CYCLE
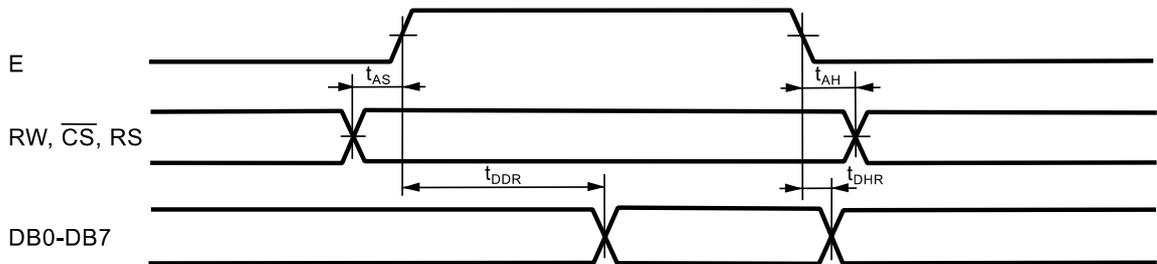
WRITE CYCLE

(VDD=5.0V, GND=0V, Ta=-20°C~75°C)

Item	Symbol	Condition	Rating		Units
			Min.	**Max.**	
Address set-up time	t_{AS}		90	-	ns
Address hold time	t_{AH}		10	-	
Data delay time (read)	t_{DDR}	C_L=50pF		140	
Data hold time (read)	t_{DHR}		10	-	
Data set-up time (write)	t_{DSW}		220	-	
Data hold time (write)	t_{DHW}		20	-	

5.2   LCM Application

Please see information on pages 16-17 of the data sheet for LCD controller LC7981. The data sheet can be found here: https://focuslcds.com/wp-content/uploads/Drivers/LC7981.pdf

5.3   Initialization Code

```c
#include <reg52.h>
#include <absacc.h>
#include <string.h>
#include <intrins.h>

sbit rs=P2^0;
sbit rw=P2^1;
sbit e=P2^2;
sbit cs=P2^3;
sbit rst=P2^4;

#define dataport P0
#define uchar unsigned char
#define uint  unsigned int

//////////////////////////////
void delay_nms(unsigned int n)
{
    unsigned int i,j;
                for(i=n;i>0;i--)
                {
                    for(j=125;j>0;j--)
                    {
                    }
                }
}
///////////////////////////

void check()
{
 dataport=0xff;
 rs=1;
 rw=1;
 cs=0;
 e=1;
while((dataport&0x80)==0x80);
 e=0;
 cs=1;
}

//
uchar rd_data()
{
uchar dat;
check();
dataport=0xff;
rs=0;
rw=1;
cs=0;
e=1;
_nop_();
dat=dataport;
e=0;
cs=1;
return(dat);
}

//
void wr_data(uchar dat)
 {
   check();
        dataport=dat;
        rs=0;
        rw=0;
        cs=0;
        e=1;
   _nop_();
   e=0;
   cs=1;
 }
```

```
void wr_com(uchar com)
{
  check();
  dataport=com;
  rs=1;
  rw=0;
  cs=0;
  e=1;
  _nop_();
  e=0;
  cs=1;
}
```

/*---*/

```
void display_lattice(unsigned char dat1,unsigned char dat2)
{
unsigned int i,j;
wr_com(0x00); //mode set
wr_data(0x32);//DISPLAY ON,MASTER,BLINK OFF,CURSOR OFF,graphic mode
wr_com(0x0a);//SET CURSOR POSITION (L BYTE)
wr_data(0x00);
wr_com(0x0b);//SET CURSOR POSITION (H BYTE)
wr_data(0x00);
wr_com(0x0c);
for(i=0;i<64;i++)
 {
 for(j=0;j<30;j++)
 {
   wr_data(dat1);
 }
 for(j=0;j<30;j++)
 {
   wr_data(dat2);
 }
 }
}

void InitLCD()
{
rs=1;
rw=1;
e=1;
wr_com(0x01);//SET CHARACTER FORMAT 8x8
wr_data(0x77);
wr_com(0x02);//SET COLUMN NUMBER
wr_data(0x1d);
wr_com(0x03);//SET FRAME NUMBER
wr_data(0x7f);
wr_com(0x04);
wr_data(0x07);
wr_com(0x08);//SET SET SADL
wr_data(0x00);
wr_com(0x09);//SET SADH
wr_data(0x00);
}
void displays(unsigned char *m)

{
    unsigned int iiii=0,pppp=0,c=0;
        wr_com(0x00); //mode set
    wr_data(0x32);//DISPLAY ON,MASTER,BLINK OFF,CURSOR OFF,graphic mode
    wr_com(0x0a);//SET CURSOR POSITION (L BYTE)
    wr_data(0x00);
    wr_com(0x0b);//SET CURSOR POSITION (H BYTE)
    wr_data(0x00);
    wr_com(0x0c);
        for(iiii=0;iiii<128;iiii++)
        {
            for(pppp=0;pppp<30;pppp++)
    {
        wr_data(m[c++]);
    }
        }
}
```

```c
void display_word(unsigned char dat, unsigned char count )
{
        unsigned int iiii=0,pppp=0;
        wr_com(0x00); //mode set
    wr_data(0x30);//DISPLAY ON,MASTER,BLINK OFF,CURSOR OFF,character mode
    wr_com(0x0a);//SET CURSOR POSITION (L BYTE)
    wr_data(0x00);
    wr_com(0x0b);//SET CURSOR POSITION (H BYTE)
    wr_data(0x00);
    wr_com(0x0c);
        for(iiii=0;iiii<count;iiii++)
         {
          for(pppp=0;pppp<30;pppp++)
           {
            wr_data(dat);
                dat++;
             }

                        delay_nms(1);
         }
}

/////////////////////////////////////////////
void display_kuang(void)
{

        unsigned int n0,n1;
        wr_com(0x00); //mode set
    wr_data(0x32);//DISPLAY ON,MASTER,BLINK OFF,CURSOR OFF,graphic mode
    wr_com(0x0a);//SET CURSOR POSITION (L BYTE)
    wr_data(0x00);
    wr_com(0x0b);//SET CURSOR POSITION (H BYTE)
    wr_data(0x00);
    wr_com(0x0c);
        for(n0=0;n0<30;n0++)
         {
    wr_data(0xff);
         }
        for(n0=0;n0<126;n0++)
     {
                for(n1=0;n1<30;n1++)
                 {
                   if (n1==0)
                    {
                    wr_data(0x01);
                     }
            else
                    {if (n1==29)
                      {
                            wr_data(0x80);
                       }
                     else
                       {
                        wr_data(0x00);
                        }
                     }
                 }
             }
        for(n0=0;n0<30;n0++)
         {
          wr_data(0xff);
         }
}
```

```
void main(void)
{
  rst=0;
  delay_nms(100);
  rst=1;
  delay_nms(100);
  InitLCD();
  while(1)
{
  display_lattice(0x00,0x00);
   delay_nms(1000);
   display_lattice(0xff,0xff);
   delay_nms(1000);
   display_kuang();
   delay_nms(1000);
   display_lattice(0xff,0x00);
   delay_nms(1000);
   display_lattice(0x55,0x55);
   delay_nms(1000);
   display_lattice(0x55,0xaa);
   delay_nms(1000);

   display_word(0x20,8);
   delay_nms(1000);
   display_word(0x30,16);
   delay_nms(1000);

}
 }
```

6. Cautions and Handling Precautions

6.1 Handling and Operating the Module

1. When the module is assembled, it should be attached to the system firmly. Do not warp or twist the module during assembly work.

2. Protect the module from physical shock or any force. In addition to damage, this may cause improper operation or damage to the module and back-light unit.

3. Note that polarizer is very fragile and could be easily damaged. Do not press or scratch the surface.

4. Do not allow drops of water or chemicals to remain on the display surface. If you have the droplets for a long time, staining and discoloration may occur.

5. If the surface of the polarizer is dirty, clean it using some absorbent cotton or soft cloth.

6. The desirable cleaners are water, IPA (Isopropyl Alcohol) or Hexane. Do not use ketene type materials (ex. Acetone), Ethyl alcohol, Toluene, Ethyl acid or Methyl chloride. It might permanent damage to the polarizer due to chemical reaction.

7. If the liquid crystal material leaks from the panel, it should be kept away from the eyes or mouth. In case of contact with hands, legs, or clothes, it must be washed away thoroughly with soap.

8. Protect the module from static; it may cause damage to the CMOS ICs.

9. Use fingerstalls with soft gloves in order to keep display clean during the incoming inspection and assembly process.

10. Do not disassemble the module.

11. Protection film for polarizer on the module shall be slowly peeled off just before use so that the electrostatic charge can be minimized.

12. Pins of I/F connector shall not be touched directly with bare hands.

13. Do not connect, disconnect the module in the "Power ON" condition.

14. Power supply should always be turned on/off by the item Power On Sequence & Power Off Sequence.

6.2 Storage and Transportation

1. Do not leave the panel in high temperature, and high humidity for a long time. It is highly recommended to store the module with temperature from 0 to 35 ℃ and relative humidity of less than 70%.

2. Do not store the TFT-LCD module in direct sunlight.

3. The module shall be stored in a dark place. When storing the modules for a long time, be sure to adopt effective measures for protecting the modules from strong ultraviolet radiation, sunlight, or fluorescent light.

4. It is recommended that the modules should be stored under a condition where no condensation is allowed. Formation of dewdrops may cause an abnormal operation or a failure of the module. In particular, the greatest possible care should be taken to prevent any module from being operated where condensation has occurred inside.

5. This panel has its circuitry FPC on the bottom side and should be handled carefully in order not to be stressed.

www.FocusLCDs.com