**PRODUCT:LCD MODULE.****Model No.: JLX177-006****Product Type: 1.77 inch QVGA TFT Modoule.**

产品规格书

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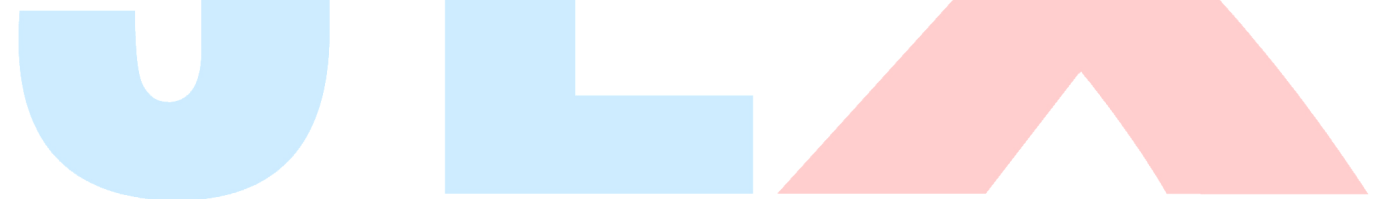
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结构	电子	核准

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1. Features & Mechanical Specifications

Item	Contents	Unit
	LCD	
LCD Type	262K TFT Transmissive Normally White	--
Viewing direction	12 O'clock	--
Backlight	2 Chip White LED in Parallel	--
Interface	8080-8bit parallel bus interface	--
Driver IC	ST7735S	--
Outline Dimension	34.0(W) × 44.9(H) × 2.4(T)	mm
Glass area (W×H×T)	30.43 × 40.47 × 1.0	mm
Active area (W×H)	28.032 × 35.04	mm
Number of Dots	128(RGB) × 160	--
Dot pitch (W×H)	0.073 × 0.219	mm
Pixel pitch (W×H)	0.219 × 0.219	mm
Operating Temperature	-10 ~ +70	℃
Storage temperature	-30 ~ +80	℃

2. Dimensional Outline

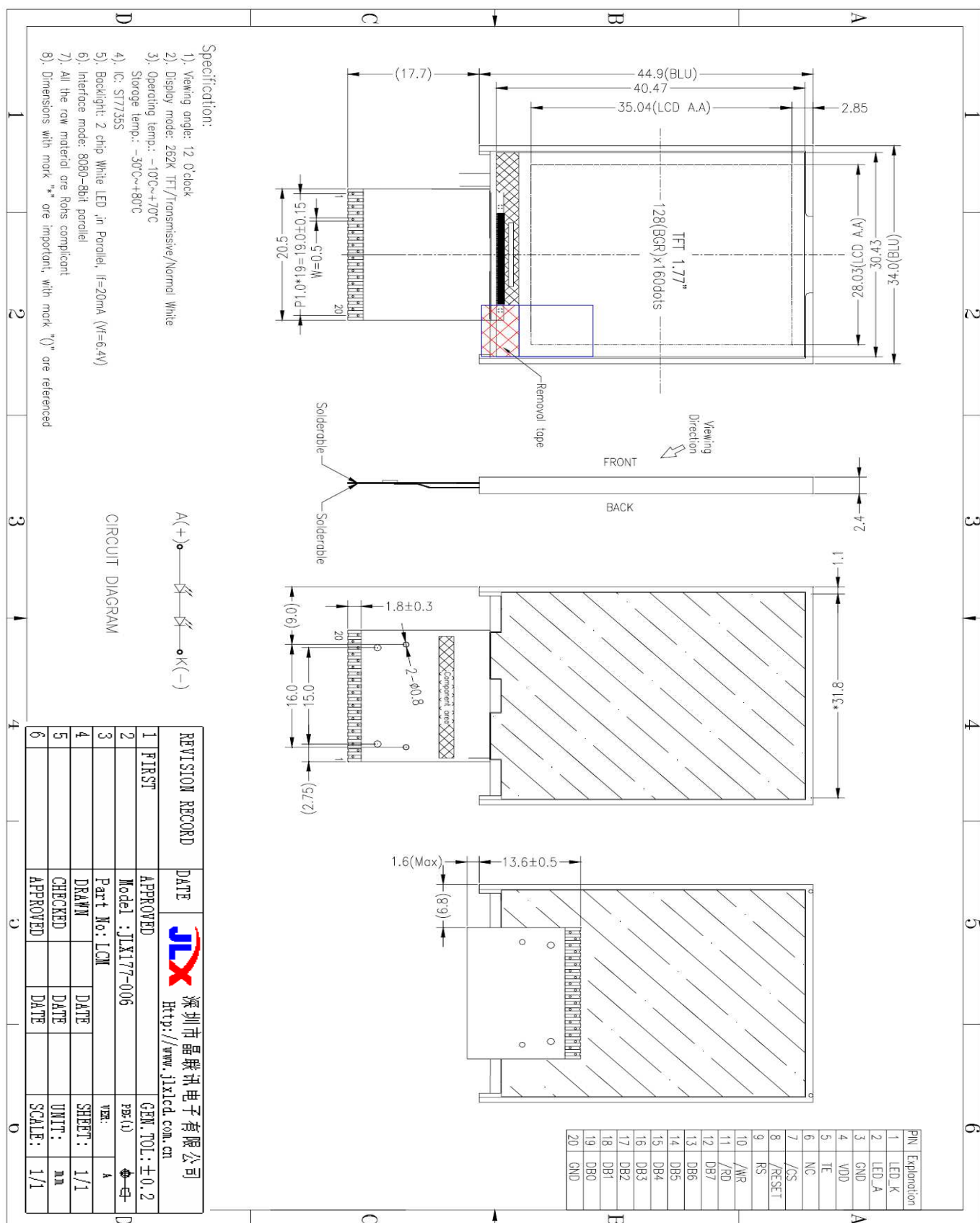


Figure 1. Dimensional outline

3. Block Diagram

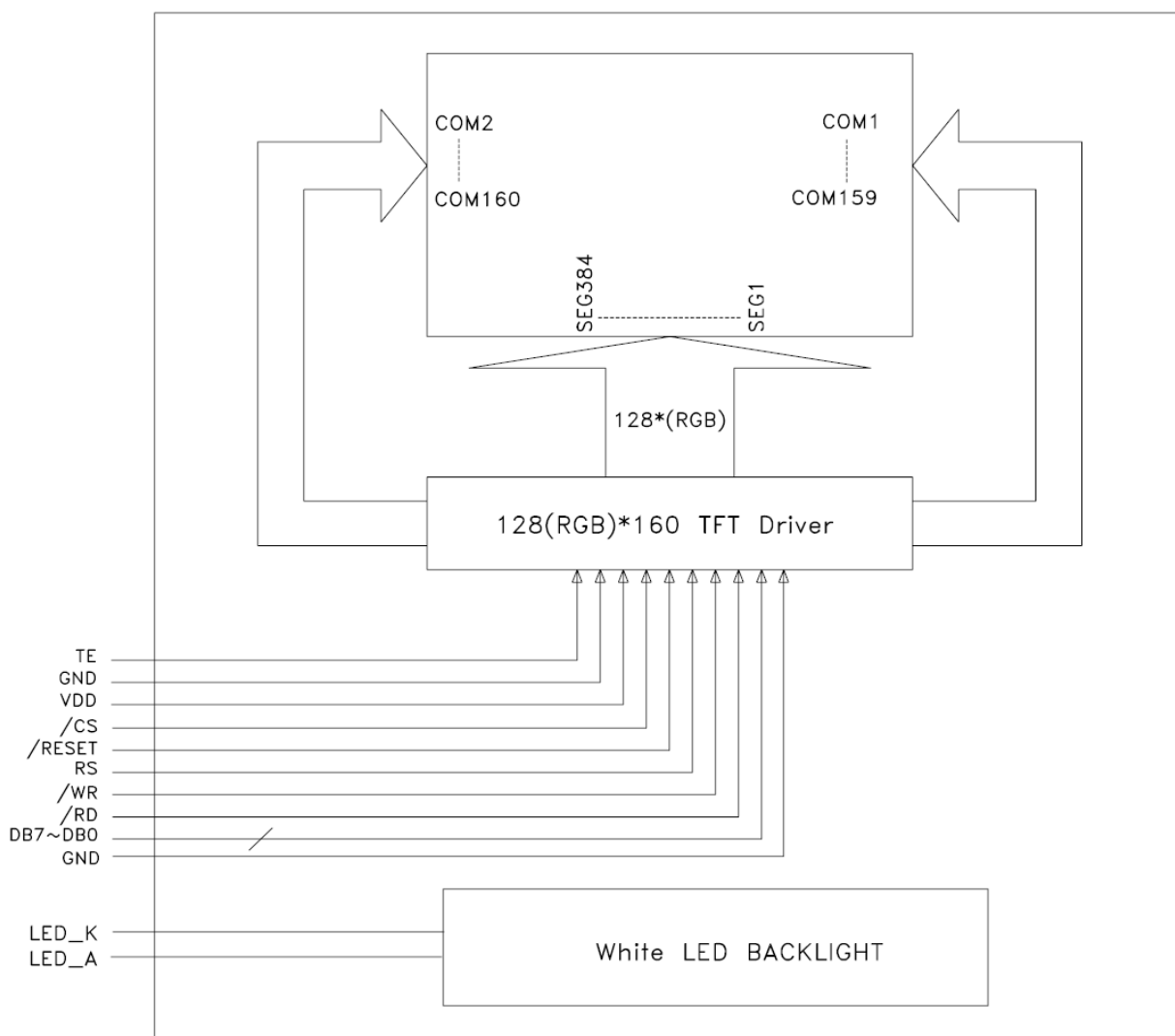
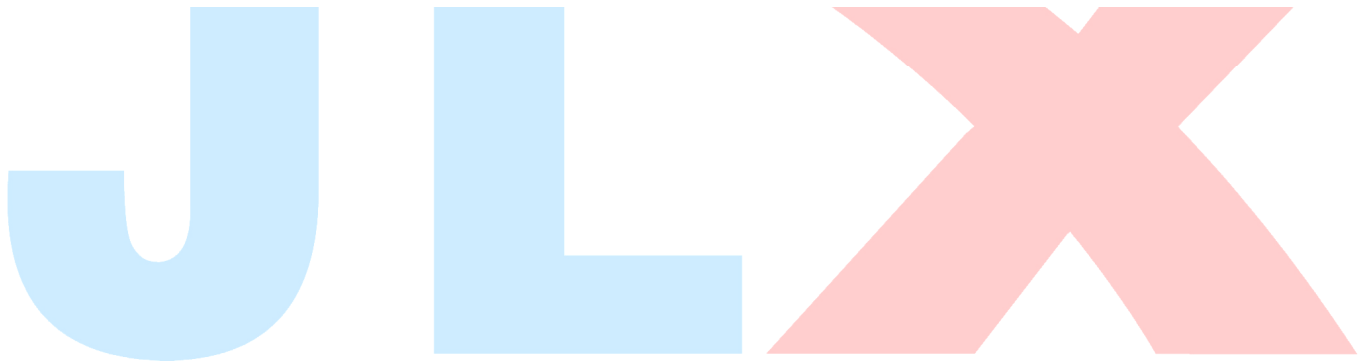


Figure 2. Block diagram

4. Pin Description

PIN No.	SYMBOL	Function
1	LED_K	Backlight LED Cathode
2	LED_A	Backlight LED Anode
3	GND	Ground
4	VDD	Power supply
5	TE	Tearing effect output pin to synchronies MCU to frame writing, activated by S/W command. When this pin is not activated, this pin is low.
6	NC	No Connection
7	/CS	Chip Select Signal ("Low" enable)
8	/RESET	Reset pin. (Active Low)
9	RS	Display data / command selection pin Low: command data High: display data
10	/WR	Write signal.
11	/RD	Read signal.
12~19	DB7~DB0	Data Bus
20	GND	Ground



5. Absolute Maximum Ratings

Item	Symbol	Rating	Unit
Supply Voltage range	VDD	-0.3 to +4.6	V
Operating Temperature range	TOP	-10 to +70	°C
Storage Temperature range	TST	-30 to +80	°C

6. Electrical Characteristics

DC Characteristics

Item Symbol		Min.	Type	Max.	Unit
Logic Supply Voltage	VDD	2.6	-	3.3 V	

7. Backlight Characteristics

White LED × 2 in Parallel

(Ta = 25°C)

Item Symbol		Condition	Min	Typ	Max	Unit
Forward Voltage	VF	IF = 20mA	-	6.4	-	V
Uniformity	ΔBp	- 80	-	-	-	%
Luminance for LCD	Lv	IF = 20mA	700	-	-	cd/m

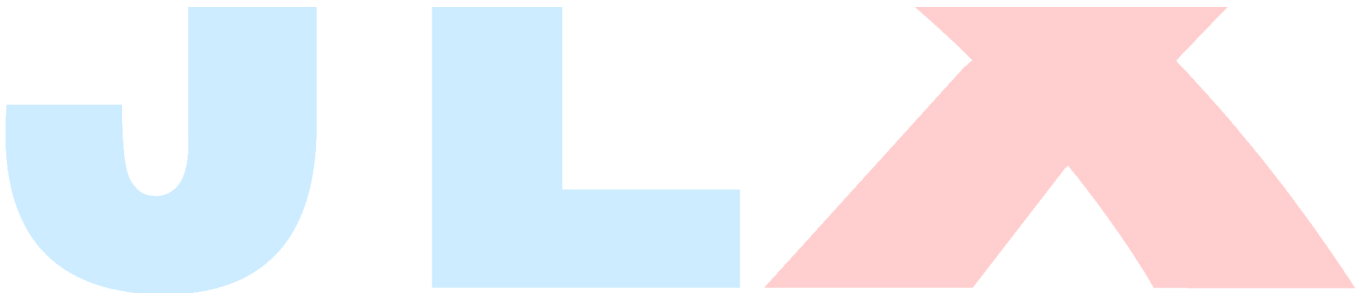
8. Instruction Description

Hex Code	Command	Description	Number of Parameters	Display Architecture Implementation Requirement		
				Type 1	Type 2	Type 3
00h	nop	No Operation	0	Yes	Yes	Yes
01h	soft_reset	Software Reset	0	Yes	Yes	Yes
06h	get_red_channel	Get the red component of the pixel at (0, 0).	1	No	Yes	Yes
07h	get_green_channel	Get the green component of the pixel at (0, 0).	1	No	Yes	Yes
08h	get_blue_channel	Get the blue component of the pixel at (0, 0).	1	No	Yes	Yes
0Ch	get_pixel_format	Get the current pixel format.	1	Yes	Yes	Yes
0Ah	get_power_mode	Get the current power mode.	1	Yes	Yes	Yes
0Bh	get_address_mode	Get the frame memory to the display panel read order.	1	Yes	Yes	Yes
0Dh	get_display_mode	Get the current display mode from the peripheral.	1	Yes	Yes	Yes
0Eh	get_signal_mode	Get display module signaling mode.	1	Yes	Yes	Yes
0Fh	get_diagnostic_result	Get Peripheral Self-Diagnostic Result.	1	Yes	Yes	Yes
10h	enter_sleep_mode	Power for the display panel is off.	0	Yes	Yes	Yes
11h	exit_sleep_mode	Power for the display panel is on.	0	Yes	Yes	Yes
12h	enter_partial_mode	Part of the display area is used for image display.	0	Yes	Yes	No
13h	enter_normal_mode	The whole display area is used for image display.	0	Yes	Yes	No
20h	exit_invert_mode	Displayed image colors are not inverted.	0	Yes	Yes	Yes
21h	enter_invert_mode	Displayed image colors are inverted.	0	Yes	Yes	Yes
26h	set_gamma_curve	Selects the gamma curve used by the display device.	1	Yes	Yes	Yes
28h	set_display_off	Blanks the display device.	0	Yes	Yes	Yes
29h	set_display_on	Show the image on the display device.	0	Yes	Yes	Yes
2Ah	set_column_address	Set the column extent.	4	Yes	Yes	No
2Bh	set_page_address	Set the page extent.	4	Yes	Yes	No
2Ch	write_memory_start	Transfer image data from the Host Processor to the peripheral starting at the location provided by set_column_address and set_page_address.	Variable	Yes	Yes	No
2Dh	write_LUT	Fills the peripheral look-up table with the provided data.	Variable	optional	No	No
2Eh	read_memory_start	Transfer image data from the peripheral to the Host Processor interface starting at the location provided by set_column_address and set_page_address.	Variable	Yes	Yes	No
30h	set_partial_area	Defines the partial display area on the display device.	4	Yes	Yes	No
33h	set_scroll_area	Defines the vertical scrolling and fixed area on display device.	6	Yes	No	No
34h	set_tear_off	Synchronization information is not sent from the display module to the host processor.	0	Yes	No	No
35h	set_tear_on	Synchronization information is sent from the display module to the host processor at the start of VFP.	1	Yes	No	No
36h	set_address_mode	Set the read order from frame memory to the	1	Yes	Yes	Yes

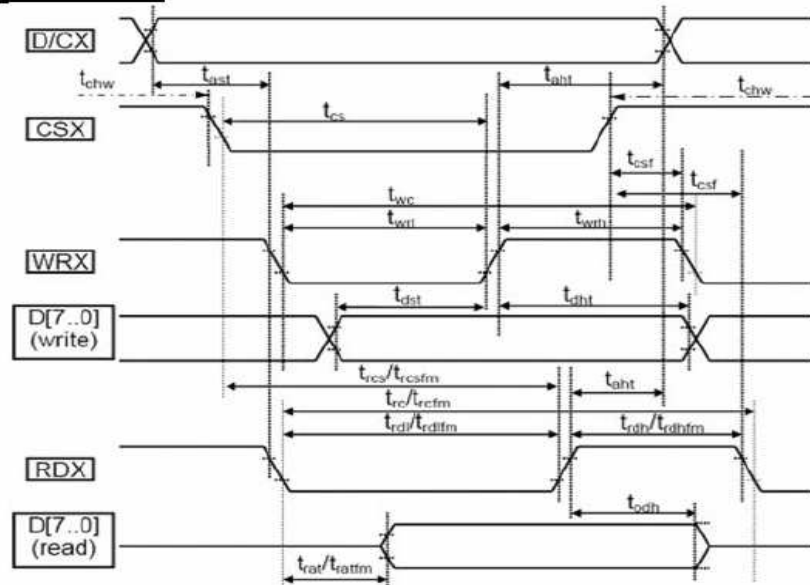
		display panel.				
37h	set_scroll_start	Defines the vertical scrolling starting point.	2	Yes	No	No
38h	exit_idle_mode	Full color depth is used on the display panel.	0	Yes	No	No
39h	enter_idle_mode	Reduced color depth is used on the display panel.	0	Yes	No	No
3Ah	set_pixel_format	Defines how many bits per pixel are used in the interface.	1	Yes	Yes	Yes
3Ch	write_memory_continue	Transfer image information from the Host Processor interface to the peripheral from the last written location.	Variable	Yes	Yes	No
3Eh	read_memory_continue	Read image data from the peripheral continuing after the last read_memory_continue or read_memory_start.	Variable	Yes	Yes	No
44h	set_tear_scanline	Synchronization information is sent from the display module to the host processor when the display device refresh reaches the provided scanline.	2	Yes	No	No
45h	get_scanline	Get the current scanline.	2	Yes	Yes	No
DAh	Read ID1					
DBh	Read ID2					
DCh	Read ID3					

Notes:

1. There will be no abnormal visible effects on the display when S/W or H/W Reset are applied.
2. After Powered-On Reset finishes within 10 μ s after both VDD & VDDI are applied.
3. Mode 1 means Tearing Effect Output Line consists of V-Blanking Information only.



9. AC Characteristics



Note: Logic high and low levels are specified as 30% and 70% of VDDI for Input signals.

Signal	Symbol	Parameter	min	max	unit	description
D/CX	tast	Address setup time	0		ns	
	taht	Address hold time(Write/Read)	10		ns	
CSX	tchwh	"S""H" Pulse Width	0		ns	
	tcs	Chip Select setup time (Write)	10		ns	
	trcs	Chip Select setup time (Read ID)	45		ns	
	trcsfm	Chip Select setup time (Read FM)	355		ns	
	tcsf	Chip Select Wait time(Write/read)	10		ns	
	tcsf	Chip Select Wait time(Write/read)	10		ns	
WRX	twc	Write cycle	66		ns	
	twrh	Controlpulse H duration	15		ns	
	twrl	Control pulse L duration	15		ns	
RDX	trc	Read cycle (ID)	160		ns	When read ID data
	trdh	Control pulse H duration(ID)	90		ns	
	trdl	Control pulse L duration(ID)	45		ns	
RDX	trcfm	Read cycle (FM)	450		ns	When read from frame memory
	trdhfm	Control pulse H duration (FM)	90		ns	
	trdlfm	Control pulse L duration (FM)	355		ns	
D[17..0]	tdst	Data setup time	10		ns	For maximum CL = 30pF For minimum CL = 8pF
	tdht	Data hold time	10		ns	
	trat	Read access time (ID)		40	ns	
	tratfm	Read access time (FM)		340	ns	
	todh	Output disable time	20	80	ns	

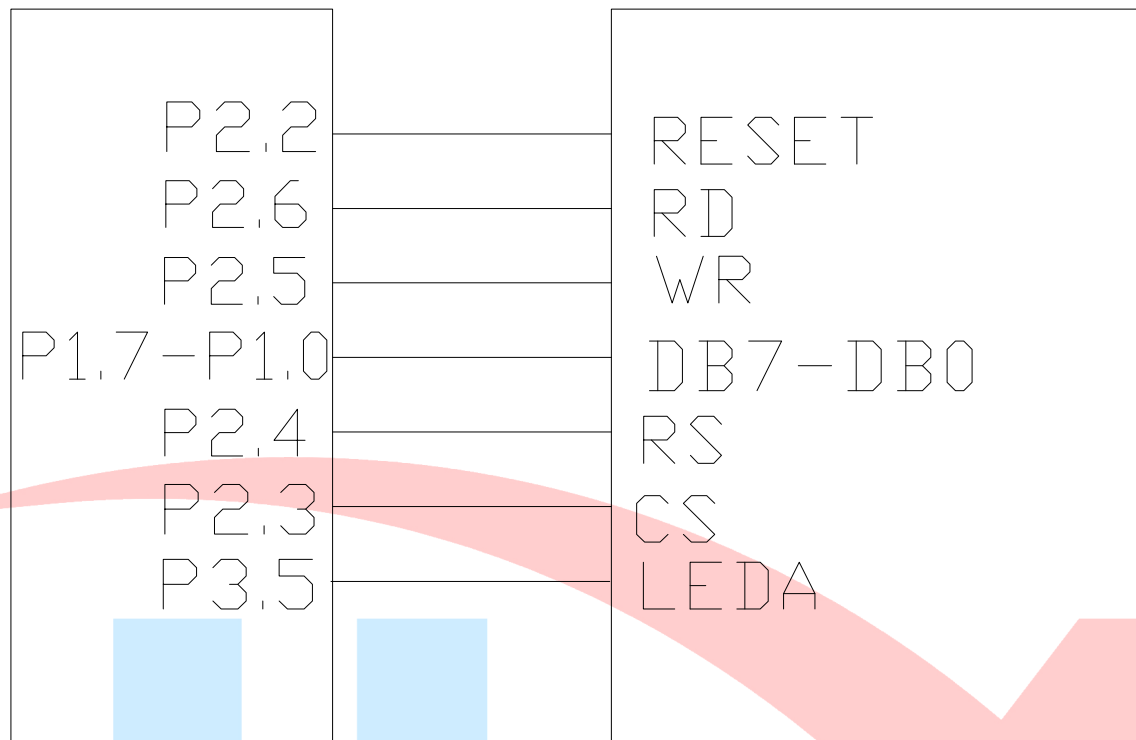
Note 1: VDDI 1.65 to 3.3V, VDD=2.6 to 3.3V, AGND=GND=0V, Ta=30 to 70 °C (to +85°C no damage)

Note 2: This input signal rise time and fall time (tr, tf) is specified at 15 ns or less. Logic high and low levels are specified as 30% and 70% of VDDI for input signals

10. Program Case

51 系列MCU

LCD 模块



```
/* 型号: JLX177-006
   驱动 IC:ST7735S
   并行 8080 时序,
   单片机:ST90C516RD+(51 系列), 晶振 12MHZ
   2012 年 09 月 04 日
*/

#include <reg51.h>
#include<intrins.h>

#define uint unsigned int
#define uchar unsigned char

sbit LCD_RESET = P2^2;    //READ
sbit LCD_RD = P2^6;      //READ
sbit LCD_WR = P2^5;      //WRITE
sbit LCD_RS = P2^4;      //REGISTER SELECT
sbit LCD_CS = P2^3;      //chip select
sbit LCD_LEDA=P3^5;      //LED BACKLIGHT SWITCH
//=====
===

void delays(int count) // X10ms
{
    int i, j;
    for(i=0;i<count;i++)
        for(j=0;j<1;j++);
}

void delaylms(int count) // X10ms
{
    int i, j;
    for(i=0;i<count;i++)
        for(j=0;j<10;j++);
}

//=====
=====

void WriteCom(uchar data1)
{
    LCD_RS = 0 ;
    LCD_CS = 0 ;
    LCD_RD=1;
    LCD_WR=0;
    P1=data1;
    LCD_WR=1;
```

```
LCD_CS = 1 ;  
}
```

```
/*  
*****  
Transfer Data  
*****  
*/
```

```
void WriteData(uchar data1)  
{  
    LCD_RS = 1 ;  
    LCD_CS = 0 ;  
    LCD_RD=1;  
    LCD_WR=0;  
    P1=data1;  
    LCD_WR=1;  
    LCD_CS = 1 ;  
}
```

```
/*  
*****  
Transfer Data  
*****  
*/
```

```
//=====
```

```
void main_address_set(void)  
{  
    WriteCom(0x2a);  
    WriteData(0x00);  
    WriteData(0x00);  
    WriteData(0x00);  
    WriteData(0x83);    //set column address 0-->128  
    WriteCom(0x2b);  
    WriteData(0x00);  
    WriteData(0x00);  
    WriteData(0x00);  
    WriteData(0xa1);    //set row address 0-->160  
    WriteCom(0x2c);    //memory write command  
}
```

```
//=====
```



```
void main_Pattern(unsigned int jk, jm)
{
    int i, j;
    main_address_set();
    for(i=0; i<132; i++)
    for(j=0; j<162; j++)
    {
        WriteData(jk);
        WriteData(jm);
    }
}
```

```
//=====
=====
```

```
void main_init(void)
{
```

```
    WriteCom(0x11);    //sleep out and booter on
    delays(120);
```

```
    WriteCom(0xB1);    //
    WriteData(0x01);
    WriteData(0x2C);
    WriteData(0x2D);
```

```
    WriteCom(0xB2);    //
    WriteData(0x01);
    WriteData(0x2C);
    WriteData(0x2D);
```

```
    WriteCom(0xB3);    //
    WriteData(0x01);
    WriteData(0x2C);
    WriteData(0x2D);
    WriteData(0x01);
    WriteData(0x2C);
    WriteData(0x2D);
```

```
    WriteCom(0xB4);    //
    WriteData(0x07);
```

```
//===== power control setting =====
```

```
    WriteCom(0xC0);    //
    WriteData(0xA2);    //
    WriteData(0x02);    //
```

```
WriteData(0x84);    //

WriteCom(0xC1);     // set VCL, VGH, VGL, AVDD
WriteData(0xC5);

WriteCom(0xC2);     //
WriteData(0x0A);    //
WriteData(0x00);

WriteCom(0xC3);     //
WriteData(0x8A);    //
WriteData(0x2A);

WriteCom(0xC4);     //
WriteData(0x8A);    //
WriteData(0xEE);    //

WriteCom(0xC5);     //
WriteData(0x0E);    //

WriteCom(0x36);     //set VCOMH, VCOML voltage
WriteData(0xC8);     //VCOMH=3.275V
WriteCom(0x20);
WriteCom(0x21);

//===== gamma"+"polarity correction characteristic setting =====
WriteCom(0xE0);
WriteData(0x02);
WriteData(0x1c);
WriteData(0x07);
WriteData(0x12);
WriteData(0x37);
WriteData(0x32);
WriteData(0x29);
WriteData(0x2d);
WriteData(0x29);
WriteData(0x25);
WriteData(0x2b);
WriteData(0x39);
WriteData(0x00);
WriteData(0x01);
WriteData(0x03);
WriteData(0x10);
//===== gamma"-polarity correction characteristic setting =====
WriteCom(0xE1);
```



```
WriteData(0x03);
WriteData(0x1d);
WriteData(0x07);
WriteData(0x06);
WriteData(0x2e);
WriteData(0x2c);
WriteData(0x29);
WriteData(0x2d);
WriteData(0x2e);
WriteData(0x2e);
WriteData(0x37);
WriteData(0x3f);
WriteData(0x00);
WriteData(0x00);
WriteData(0x02);
WriteData(0x10);
WriteCom(0x20); //
WriteCom(0x36); // memory access control
WriteData(0xcc);
WriteCom(0x3A); //EOH or EI Register enable or disabl
WriteData(0x05); //EOH or EI Register enable
WriteCom(0x29); //display on
}
```

//==主程序==

```
main()
{
    LCD_LEDA=0;
    LCD_RESET=0;
    delayms(10);
    LCD_RESET=1;
    delayms(2);
    main_init();
    while(1)
    {
        main_init();

        main_Pattern(0x00, 0x00); //black
        delayms(10);

        main_Pattern(0xff, 0xff); //white
        delayms(10);

        main_Pattern(0xf8, 0x00); //red
    }
}
```

```
    delay1ms(10);  
  
    main_Pattern(0x07, 0xe0);          //green  
    delay1ms(10);  
  
    main_Pattern(0x00, 0x1f);          //blue  
    delay1ms(10);  
  
    }  
}
```

