M451 Display BMP File From USB Disk

Example Code Introduction for 32-bit NuMicro® Family

Information

Application	This sample code reads the BMP file of USB DISK contents using M451
BSP Version	M451BSP_v3.01.003
Hardware	NuTiny-EVB-M451-LQFP100 V1.3

1 Function Description

1.1 Introduction

Using the M451 TINY BOARD, use the EBI interface to connect the 3.5-inch TFT screen and read out the BMP file of USB DISK contents.BMP format is 24 BIT, converted to RGB 565 format throw out.

2 Code Description

ILI9325 initialization：

```
void ILI9325_Initial(void)
{
    SET_RST;
    CLK_SysTickDelay(1000);  // Delay 1ms
    CLR_RST;
    CLK_SysTickDelay(10000); // DeLCD_CtrlWrite_ILI9325lay 10ms ,This delay time is necessary
    SET_RST;
    CLK_SysTickDelay(50000); // Delay 50 ms

    //************* Start Initial Sequence **********//

    LCD_WR_REG(0xCF);
    LCD_WR_DATA(0x00);
    LCD_WR_DATA(0xC1);
    LCD_WR_DATA(0X30);
    LCD_WR_REG(0xED);
    LCD_WR_DATA(0x64);
    LCD_WR_DATA(0x03);
    LCD_WR_DATA(0X12);
    LCD_WR_DATA(0X81);
    LCD_WR_REG(0xE8);
    LCD_WR_DATA(0x85);
    LCD_WR_DATA(0x10);
    LCD_WR_DATA(0x7A);
    LCD_WR_REG(0xCB);
    LCD_WR_DATA(0x39);
    LCD_WR_DATA(0x2C);
    LCD_WR_DATA(0x00);
    LCD_WR_DATA(0x34);
    LCD_WR_DATA(0x02);
    LCD_WR_REG(0xF7);
    LCD_WR_DATA(0x20);
    LCD_WR_REG(0xEA);
    LCD_WR_DATA(0x00);
    LCD_WR_DATA(0x00);
    LCD_WR_REG(0xC0);    //Power control
    LCD_WR_DATA(0x1B);   //VRH[5:0]
```

```
    LCD_WR_REG(0xC1);    //Power control
    LCD_WR_DATA(0x01);   //SAP[2:0];BT[3:0]
    LCD_WR_REG(0xC5);    //VCM control
    LCD_WR_DATA(0x30);   //3F
    LCD_WR_DATA(0x30);   //3C
    LCD_WR_REG(0xC7);    //VCM control2
    LCD_WR_DATA(0XB7);
    LCD_WR_REG(0x36);    // Memory Access Control
    LCD_WR_DATA(0x48);
    LCD_WR_REG(0x3A);
    LCD_WR_DATA(0x55);
    LCD_WR_REG(0xB1);
    LCD_WR_DATA(0x00);
    LCD_WR_DATA(0x1A);
    LCD_WR_REG(0xB6);    //Display Function Control
    LCD_WR_DATA(0x0A);
    LCD_WR_DATA(0xA2);
    LCD_WR_REG(0xF2);    //3Gamma Function Disable
    LCD_WR_DATA(0x00);
    LCD_WR_REG(0x26);    //Gamma curve selected
    LCD_WR_DATA(0x01);
    LCD_WR_REG(0xE0);    //Set Gamma
    LCD_WR_DATA(0x0F);
    LCD_WR_DATA(0x2A);
    LCD_WR_DATA(0x28);
    LCD_WR_DATA(0x08);
    LCD_WR_DATA(0x0E);
    LCD_WR_DATA(0x08);
    LCD_WR_DATA(0x54);
    LCD_WR_DATA(0XA9);
    LCD_WR_DATA(0x43);
    LCD_WR_DATA(0x0A);
    LCD_WR_DATA(0x0F);
    LCD_WR_DATA(0x00);
    LCD_WR_DATA(0x00);
    LCD_WR_DATA(0x00);
    LCD_WR_DATA(0x00);
    LCD_WR_REG(0XE1);    //Set Gamma
    LCD_WR_DATA(0x00);
    LCD_WR_DATA(0x15);
    LCD_WR_DATA(0x17);
```

```
    LCD_WR_DATA(0x07);
    LCD_WR_DATA(0x11);
    LCD_WR_DATA(0x06);
    LCD_WR_DATA(0x2B);
    LCD_WR_DATA(0x56);
    LCD_WR_DATA(0x3C);
    LCD_WR_DATA(0x05);
    LCD_WR_DATA(0x10);
    LCD_WR_DATA(0x0F);
    LCD_WR_DATA(0x3F);
    LCD_WR_DATA(0x3F);
    LCD_WR_DATA(0x0F);
    LCD_WR_REG(0x2B);
    LCD_WR_DATA(0x00);
    LCD_WR_DATA(0x00);
    LCD_WR_DATA(0x01);
    LCD_WR_DATA(0x3f);
    LCD_WR_REG(0x2A);
    LCD_WR_DATA(0x00);
    LCD_WR_DATA(0x00);
    LCD_WR_DATA(0x00);
    LCD_WR_DATA(0xef);
    LCD_WR_REG(0x11);   //Exit Sleep
    CLK_SysTickDelay(120000);
    LCD_WR_REG(0x29);   //display on

    //set xy, y
    LCD_WR_REG(0x36);
    LCD_WR_DATA(0x0);

    //set x, y memory access
    LCD_WR_REG(0x2a);
    LCD_WR_DATA(0 >> 8);
    LCD_WR_DATA(0 & 0XFF);
    LCD_WR_DATA(320 >> 8);
    LCD_WR_DATA(320 & 0XFF);
    LCD_WR_REG(0x2b);
    LCD_WR_DATA(0 >> 8);
    LCD_WR_DATA(0 & 0XFF);
    LCD_WR_DATA(480 >> 8);
    LCD_WR_DATA(480 & 0XFF);
```

```
}
```

Initialize USB Host Mass Storage：

```
int  USBH_MassInit(void)
{
    int i = 0;

    g_umas = NULL;

    for(i = 0; i < UMAS_MAX_DEV; i++)
        _umac_alloc_mark[i] = 0;
    /* register the driver, return -1 if error */
    if(USBH_RegisterDriver(&_UsbMassStorageDriver) < 0)
        return -1;
    return 0;
}
```

Read the BMP file of the contents of USB DISK in main：

```
while (1)
{
     LCD_SetCursor(0, p);
     LCD_WR_REG(0x2c);
     res = f_read(&file1, Buff, 320 * 3, &s1);

     for (i = 0; i < s1; i = i + 3)
     {
          b = Buff[i] >> 3;
          g = Buff[i + 1] >> 2;
          r = Buff[i + 2] >> 3;
          color = b | (g << 5) + (r << (5 + 6));
          LCD_WR_DATA(color);
     }

     p--;

     if (res || s1 == 0)
          break;
}
```

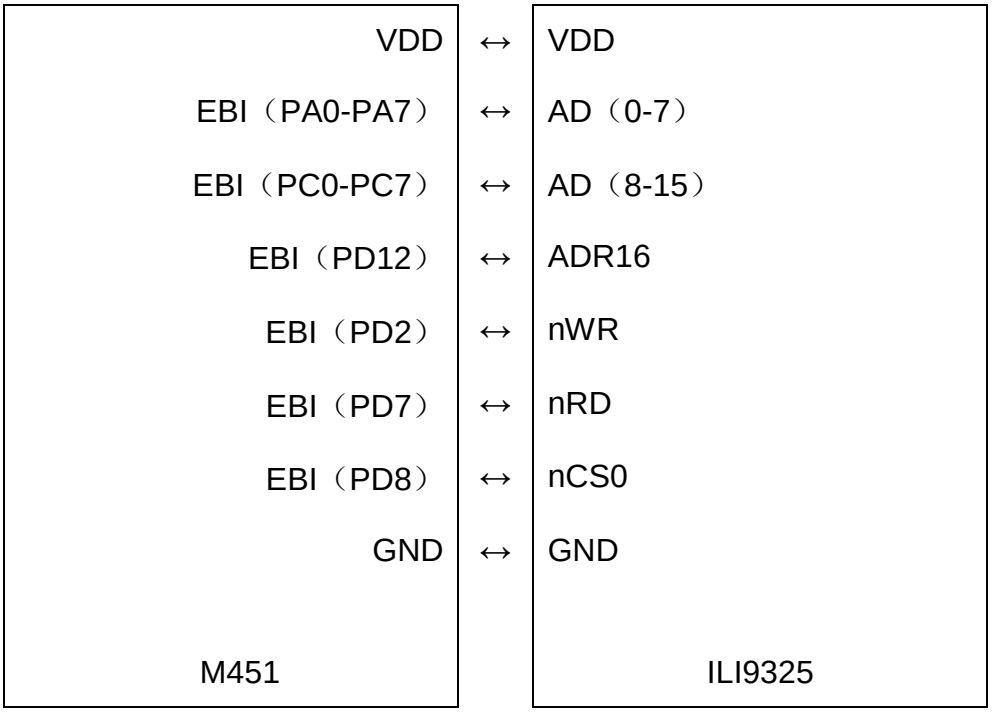
3 Software and Hardware Environment

Software Environment

- BSP version
  - M451BSP_v3.01.003
- IDE version
  - Keil uVersion5.25

Hardware Environment

- Circuit components
  - NuTiny-EVB-M451
  - ILI9325
- Diagram



4 Directory Information

- EC_M451_Display_BMP_File_From_USB_Disk_V1.00
  - Library — Sample code header and source files
    - CMSIS — Cortex® Microcontroller Software Interface Standard (CMSIS) by Arm® Corp.
    - Device — CMSIS compliant device header file
    - StdDriver — All peripheral driver header and source files
    - UsbHostLib — USB host library source code
  - SampleCode
    - ExampleCode — Source file of example code
  - ThirdParty
    - FatFs — A generic FAT file system module for small embedded systems. Its official website is: http://elm-chan.org/fsw/ff/00index_e.html.

5 How to Execute Example Code

1. Browsing into sample code folder by Directory Information(section 4) and double click Display_BMP_File_From_USB_Disk.uvproj.
2. Enter Keil compile mode
   a. Build
   b. Download
   c. Start/Stop debug session
3. Enter debug mode
   a. Run

6 Revision History

Date	Revision	Description
Jul.24, 2019	1.00	1. Initially issued.

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