RA8875 DMA with External Graphic Library Serial Flash Programmer

User Guide

Description：RA8875 supports the external Serial flash DMA function. Normally, we use the dedicated programmer, such as Hi-Lo "All-11 and All-100", etc. which can be used as a flash memory programming tool. In order to facilitate this function be used, RAiO provides the other alternative for programming the Serial Flash Memory, using the RA8875 development board. In this option, the user is able to create the related S/W and H/W application of RA8875, and also be able to program the external serial flash memory by the development board easily.

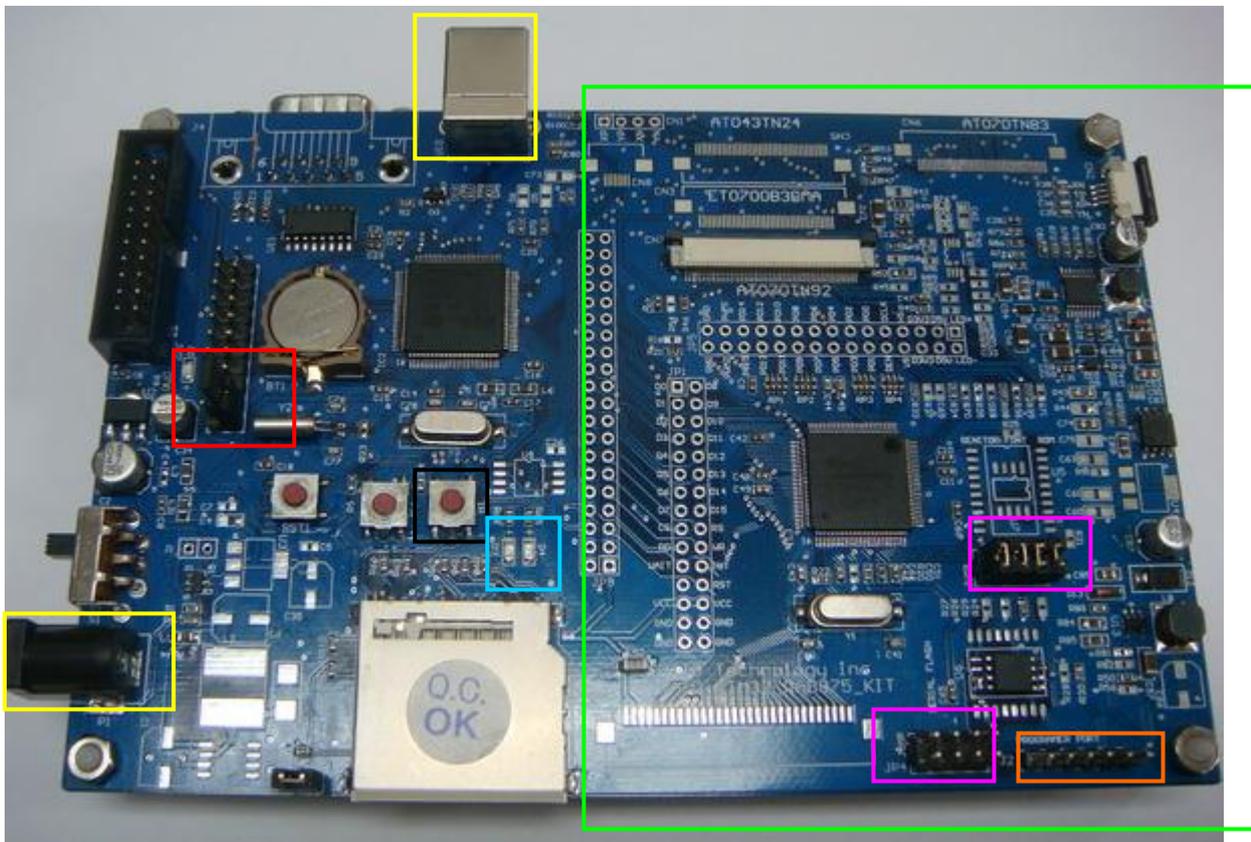## 1. Hardware Introduction: RAIO_STM32_RA8875_KIT (Develop KIT)

Figure 1   STM32_RA8875_KIT

Green frame: RA8875 controller with the TFT driving circuit, this part of circuitry is used for display application.

Yellow frame: There are two alternatives for the power supply of the development board, "DC 5V" and "USB", user can choose one of them as a 5V power supply input.

Red frame: The JP8 is used to select the operating mode of the development board.

When the pin16 and pin18 are shorted, the board is staying in the programming mode.

When the pin16 and pin18 are opened, the board is staying in the Demo mode.

Pink frame: Jumper, to select the connected target.

When JP4 is shorted and JP3 is opened, the serial interface is connected to MCU.

When JP3 is shorted and JP4 is opened, the serial interface is connected to RA8875.

Orange frame: The external programming interface (J2), it is used to communicate with the other source/target board.

Pin1	FCS
Pin2	FDO
Pin3	FDI
Pin4	FCL
Pin5	VCC
Pin6	GND

Black frame: Button "B1", it is used to start the serial flash programming, but the SD card must be inserted into the card connector before starting the programming operation. When the button "B1" is pressed, the LED "D4" begins to blink, and then the system starts the programming operation.

Blue frame: Status of the programming, the LED "D3" is color green and the LED "D4" is color red. Please refer to the Table 1 for the serial flash memory programming status.

Table 1

	D3 Green LED	D4 Red LED
Demo mode	OFF	OFF
Program mode	ON	ON
Chip erase	ON	Blinking
Chip program and verify	Blinking	OFF
Error	OFF	ON
Program done	ON	OFF

2. Software: BCB_RA8875_AP_Release (BMP Conversion to bin + bin combine program)

Please visit to RAiO's website/Member Center for downloading the corresponding software which is also including the user guide. (www.raio.com.tw)

There are 2 new files will be generated after the BMP conversion is completed:

"AllPic65kCombine.bin"

"PicBin65kInf.txt"

User has to rename the file which is with the *.bin suffix from "*AllPic65kCombine.bin*" to "*AllPic.bin*", and then store the file "*AllPic.bin*" to the SD card by the PC. "*AllPic.bin*" is a specified file name for the programmer identification, so please make sure the file name is modified before starting the serial flash memory programming. "*PicBin65kInf.txt*" contains the some information for the firmware programming of RA8875, such as the start/end address of the display pattern etc,.

3.Program Method：Program the display pattern data from the SD card to the serial flash of the development board.

Figure 2

Figure 2 shows the compatible the SD card and the memory size should be less than 4GByte.

RA8875 supports the following serial flash：

MX25L80 (8Mbit)

MX25L16 (16Mbit)

MX25L32 (32Mbit)

MX25L64 (64Mbit)

MX25L128 (128Mbit)

The clock frequency of serial flash memory, it is recommended to use more than 80MHz for getting better display performance. Besides, user must make sure that the data size of the Bin file is less than the capacity of the target serial flash .If data size is more than the capacity of serial flash, the programming operation will still be going until the procedure of " **Programming Verify**" is executed, and the system will present a status "error".

There is an example for the calculation of serial flash actual capacity, such as MX25L64 is configured as 8,388,608 x 8 internally, so the number of memory locations it can address from 0x000000 to 0x7FFFFF.

If user wants to check up the data size of Bin file, there are so many commercial text editors can be used to observe, such as UltraEdit32 from Microsoft.

Programming time summary of the development board (including data verification):

32Mbit Flash about 100 seconds.

64Mbit Flash about 200 seconds.
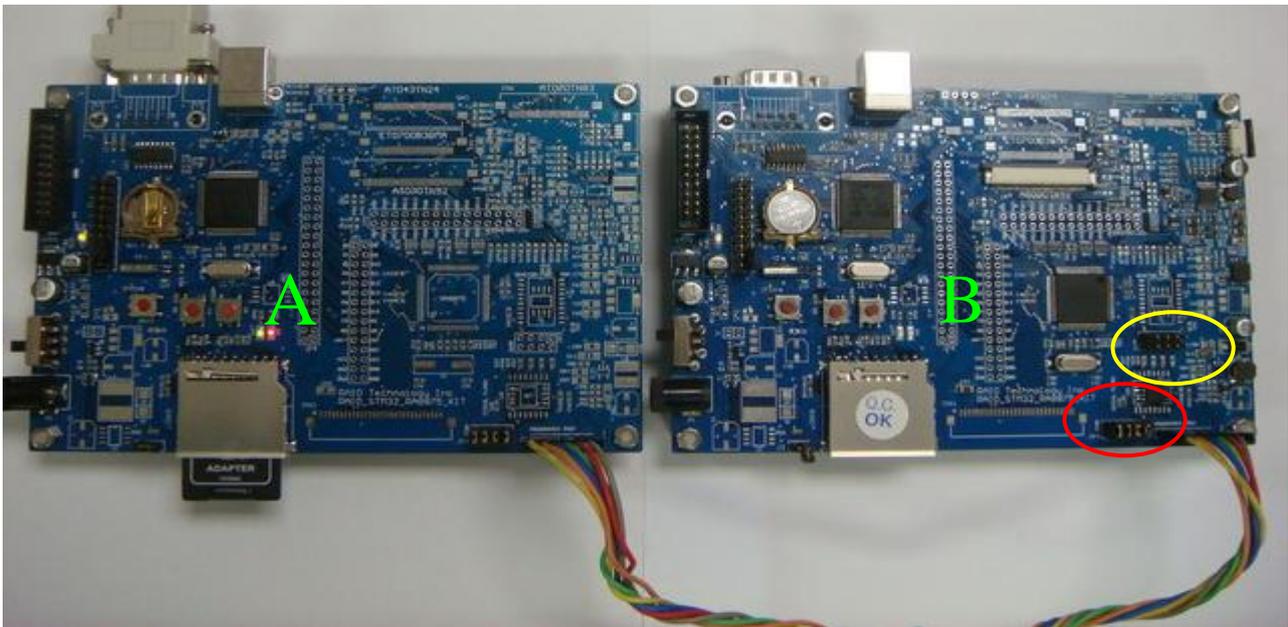
128Mbit Flash about 400 seconds.

Figure 3

Figure 3 shows the programming example which is carried out by two development board of RA8875. The board "A" is a programmer and the board "B" is a target board with serial flash memory. The cable length is about 30 centimeters. (It is recommend that the cable do not use longer than 30 centimeters) The example illustrates that the board A is a programmer; it will get the pattern data from SD card and program them into the serial flash memory through the serial interface between the two boards. So please insure the connection of the flash memory (Board B) is selected in the programming path before starting the serial flash programming operation. In this instance, we would like to suggest user has to preset a switching jumper and an external connector (The external connector is used to communicate with the other external programmer), this kind of design is used to decide the serial flash memory of board B is stayed in the data programming mode or in the normal operation mode with RA8875. Therefore users will be able to change circuitry path easily when they are creating the firmware of RA8875.

Shown at the yellow frame of the target board "B", if the JP3 is opened, it means that serial flash memory is separated from the main circuitry of RA8875 and connected to the external programming port. This step can avoid the programming failure which might be caused by the wrong access of RA8875.
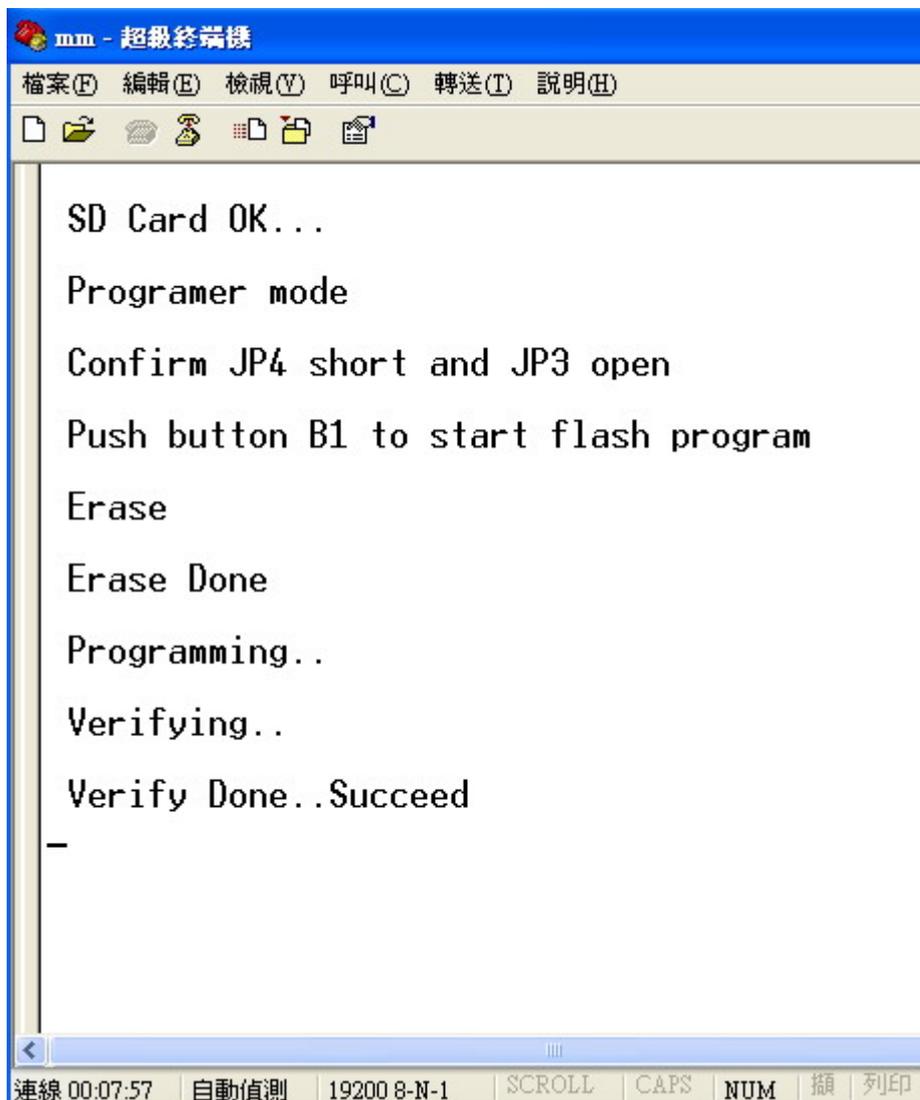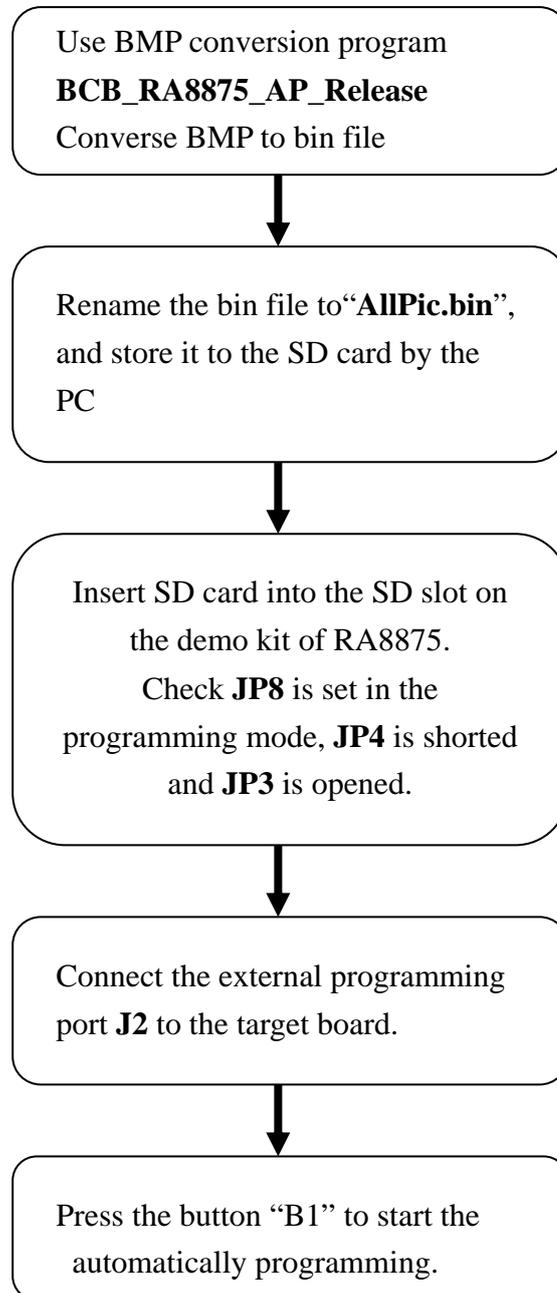
4. Status Display: By RS232

Figure 4

1. Use "J4". (RS232 port)
2. Connect to PC.
3. Execute Windows HyperTerminal.
4. Set Baud Rate equal to 19200.
5. Turn on the power of the programmer.

After the above procedures, we will be able to monitor the programming status by PC. This is illustrated in the figure 4.

Flow Chart:

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┌─────────────────────────────┐
│ Use BMP conversion program  │
│ BCB_RA8875_AP_Release       │
│ Converse BMP to bin file    │
└─────────────────────────────┘
              │
              ▼
┌─────────────────────────────┐
│ Rename the bin file to      │
│ "AllPic.bin",               │
│ and store it to the SD card │
│ by the PC                   │
└─────────────────────────────┘
              │
              ▼
┌─────────────────────────────┐
│ Insert SD card into the SD  │
│ slot on the demo kit of     │
│ RA8875.                     │
│ Check JP8 is set in the     │
│ programming mode, JP4 is    │
│ shorted and JP3 is opened.  │
└─────────────────────────────┘
              │
              ▼
┌─────────────────────────────┐
│ Connect the external        │
│ programming port J2 to the  │
│ target board.               │
└─────────────────────────────┘
              │
              ▼
┌─────────────────────────────┐
│ Press the button "B1" to    │
│ start the automatically     │
│ programming.                │
└─────────────────────────────┘
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Note： The related information for RA8875, please visit RAiO's website (www.raio.com.tw), or contact with RAiO's distributor/sales department.