

# Multiplexing Pins Between SDRAM and FLEXPBUS on K65/K66

## 1. Introduction

This application note introduces the key features on K65/K66, where pins can be multiplexed between the SDRAM and FLEXPBUS port. This helps save many pins in the application and is useful in applications that require many function pins.

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## 2. Pins multiplexed between SDRAM and FLEXBUS

Table 1 shows the list of pins that can be multiplexed. When the SDRAM and FLEX BUS are both working, the multiplexed pins switch automatically. No other configuration is required when it is running.

Table 1. **Multiplexed pins between SDRAM and FLEX BUS**

SDRAM	FLEX BUS
D15 – D0	A15 – A0
D31 – D16	AD31 – AD16
A23 – A9	AD15 – AD1
DQM3	BE31-24/CS4
DQM1	BE15-8/CS2
DQM0	BE7-0/CS3

The FLEX BUS BE function is configured in FB\_CSPMCR.

### 3. Example for hardware connection

In this application, the following design connects to both SDRAM and 16-bit FLEX BUS-based LCD with multiplexed pins. The multiplexed pins are identified with green rectangles.

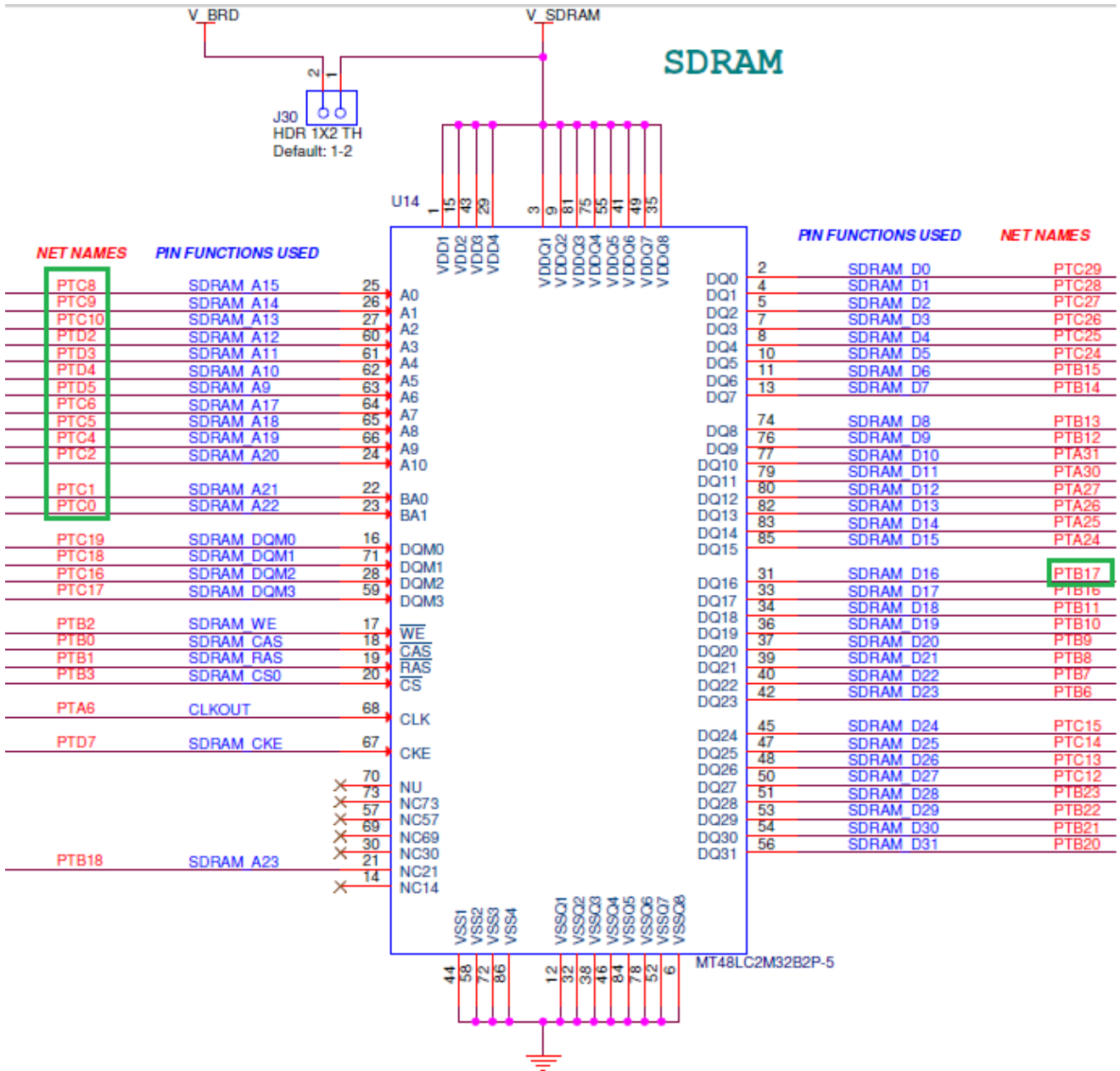


Figure 1. Multiplexed pins on SDRAM

Demo to show this feature

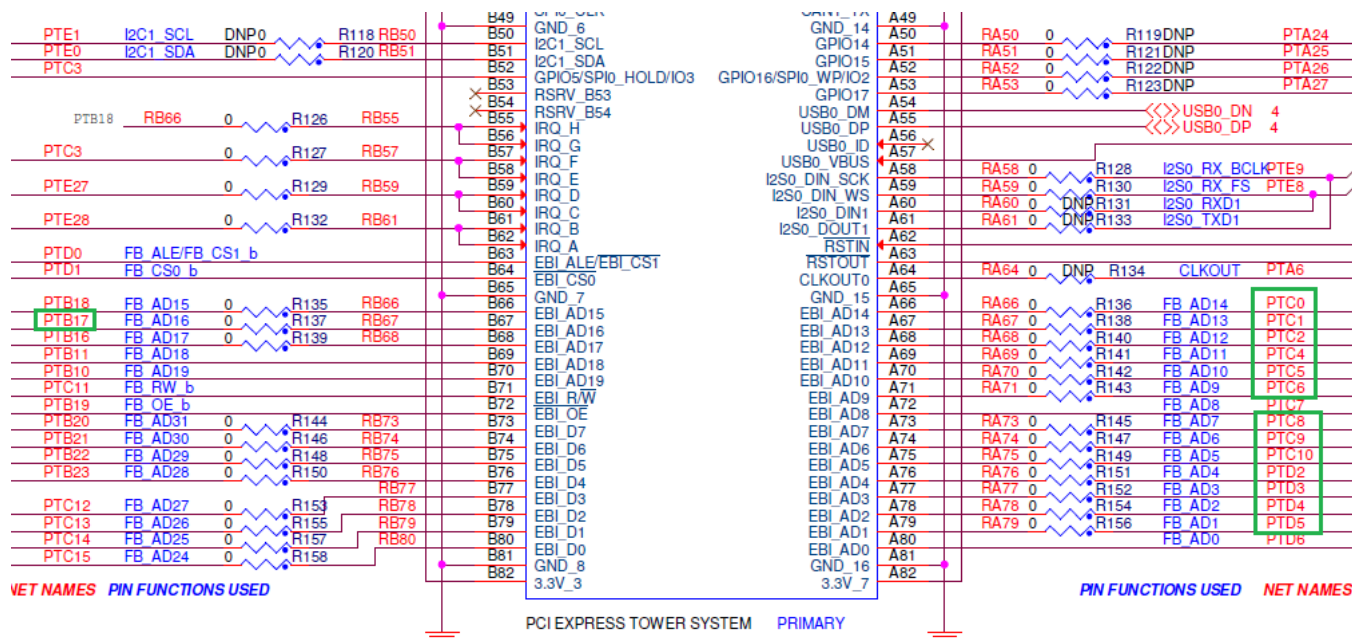


Figure 2. Multiplexed pins on FLEX BUS

For the full schematic document, refer to the TWR-K65/K66 Freescale Tower System development board link.

As shown in the images, if these pins are not multiplexed, multiple additional pins are required.

## 4. Demo to show this feature

The picture is loaded from on-chip to SDRAM after powering on. The picture is then loaded from SDRAQMA to the FLEX BUS based LCD screen. Figure 3 shows this feature.

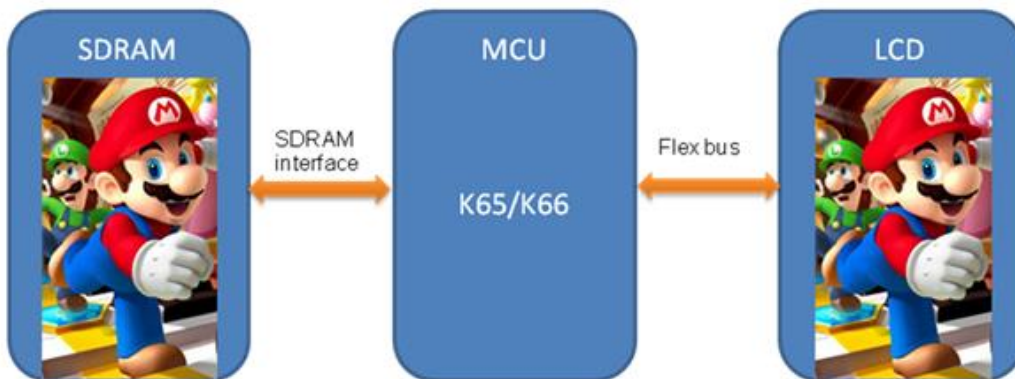


Figure 3. Demo to show this feature

The running result:



Figure 4. Running result of the demo

The two pictures are loaded from SDRAM to LCD alternatively in this demo.

## 5. Code for the demo

The main code is shown below.

Initialize the SDRAM and FLEX BUS, then initialize LCD and copy picture data from on-chip flash to SDRAM. Show the two pictures alternatively from SDRAM to LCD.

The full software package is also attached with this application note.

```
void lcd_show(void)
{
    // point to SDRAM
    short * p1 = (short*)0x70000000;
    short * p2 = (short*)0x70100000;
    int i;

    // initiate SDRAM, flex bus and LCD
    sdramc_init(120*1000);
    flex_bus_init();
    lcdc_init();

    // load image from on-chip flash to SDRAM
    for(i=0; i<320*240; i++)
```

## References

```

{
    p1[i] = pic1[i];
    p2[i] = pic2[i];
}

// show image from SDRAM to LCD which is connected by flex bus
while(1)
{
    lcdc_fill_window_pic(0,0,319, 239, (unsigned short *)p1);
    for(i=0; i<1000*1000*10; i++);
    lcdc_fill_window_pic(0,0,319, 239, (unsigned short *)p2);
    for(i=0; i<1000*1000*10; i++);
}
}

```

## 6. Conclusion

This application note discusses how to share pins between SDRAM and FLEX BUS, which is an important feature of K65/K66. This feature is useful in using applications that require many pins. A demo also shows how to make hardware connection and how to make code to implement this feature.

## 7. References

The following reference documents are available on [www.freescale.com](http://www.freescale.com).

- K65 Sub-Family Reference Manual (document K65P169M180SF5RMV2)
- K66 Sub-Family Reference Manual (document K66P144M180SF5RMV2)

## 8. Revision History

Table 2. Revision history

Revision Number	Date	Substantive changes
0	03/2015	Initial Release

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