SAMSUNG ELECTRONICS

Installation Manual
For Post processor

S3C6400/6410

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S3C6400/6410 RISC Microprocessor
Installation Manual for Post Processor

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1.20	- Test application is changed		Jiun Yu	2007-10-29
1.21	- Compiled as toolchain 4.2.2-eabi		Jiun Yu	2008-01-17
2.00	- Supporting Post processor driver on S3C6410		Jiun Yu	2008-07-05
2.10	- Tested on linux kernel 2.6.24		Jiun Yu	2008-08-29

Contents

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1 Introduction

In this Chapter, you will understand the following:

- Section 1.1, “Overview”
- Section 1.2, “Features”

1.1 Overview

Post processor performs video/graphic scale, video format conversion and color space conversion.

1.2 FEATURES

The features of the Post Processor:

- AMBA AHB V2.0 compatible interface
- Dedicated DMA with offset address
- 3 channel scaling pipelines for video/graphic scaling up/down or zooming in/out
- Video input format: 420, 422 format
- Graphic input format: 16-bit(565 format) or 24-bit
- Graphics output format to memory: 16-bit(565 format) / 24-bit graphic data(progressive only)
- Video output format to memory: YCBCR420, YCBCR422
- Output format to external FIFO: YCBCR444 / RGB(30-bit) for interlace and progressive
- Free run mode operation
- Programmable source and destination image size up to 2048 x 2048 resolution
- Programmable scaling ratio
- Format conversion for video signals
- Color space conversion from YCBCR to RGB
- Color space conversion from RGB to YCBCR
- Maximum burst length is increased to 16 for DMA
- Separate processing clock with AHB interface clock
- This block cannot be the default master

2 Setup Post Processor Driver

In this Chapter, you will understand the following:

- Setup for S3C6400/6410 Post Processor

2.1 Kernel Setup for S3C6400/6410 Post Processor

Please follow the procedure given bellow to complete the test procedure for S3C6400/6410.

Post processor driver is made as module type. So it is compiled independently.

First, before compiling the kernel, please modify “reserved_mem.h” header file in kernel

The path of “reserved_mem.h” file is :

- s3c-linux-2.6.16/include/asm-arm/arch-s3c64xx/
- s3c-linux-2.6.21/include/asm-arm/arch-s3c2410/

Please modify like below.

```
#ifndef _ASM_ARM_ARCH_RESERVED_MEM_H
#define _ASM_ARM_ARCH_RESERVED_MEM_H


/*
 * Defualt reserved memory size
 * MFC       : 6 MB
 * Post      : 8 MB
 * JPEG      : 8 MB
 * Camera    : 15 MB
 * These sizes can be modified
 */


//#define CONFIG_RESERVED_MEM_JPEG
//#define CONFIG_RESERVED_MEM_JPEG_POST
//#define CONFIG_RESERVED_MEM_MFC
#define CONFIG_RESERVED_MEM_MFC_POST
//#define CONFIG_RESERVED_MEM_JPEG_MFC_POST
//#define CONFIG_RESERVED_MEM_CAMERA
//#define CONFIG_RESERVED_MEM_JPEG_CAMERA
//#define CONFIG_RESERVED_MEM_JPEG_POST_CAMERA
//#define CONFIG_RESERVED_MEM_MFC_CAMERA
//#define CONFIG_RESERVED_MEM_MFC_POST_CAMERA
//#define CONFIG_RESERVED_MEM_JPEG_MFC_POST_CAMERA
//#define CONFIG_RESERVED_MEM_MFC_REORDER_ENABLE
```

FIGURE . Setup reserved memory

NOTE: for detailed information about how to build Linux Kernel and how to download kernel image and cramfs, please refer to related porting guide documents.

Second, please compile the post processor module as shown below. (At Host Side)

Before compiling the post processor driver module, please modify “Makefile”. kernel directory should be modified in “Makefile” like below.

```
#####################################################
# Makefile for Post Processor
# 2007 (C) Samsung Electronics
# Author : Jiun. Yu <jiun.yu@samsung.com>
#####################################################

KERNEL_DIR := /home/mobile/workspace/s3c-linux-2.6.24
TOPDIR     := /home/mobile/workspace/s3c-linux-2.6.24

obj-m       := s3c_pp.o

s3c_pp-y := s3c_pp_common.o s3c_pp_6400.o

PWD         := $(shell pwd)

here:
    (cd $(KERNEL_DIR); make SUBDIRS=$(PWD) modules)

clean:
    rm -rf *.ko
    rm -rf *.mod.*
    rm -rf .*.cmd
    rm -rf *.o
    rm -rf Module.*
```

FIGURE . Makefile of Post processor

s3c_pp.ko file is module object.

```
[root@localhost pp_drv]# ls
CVS  Makefile  README  s3c_pp_6400.c  s3c_pp_common.c  s3c_pp_common.h
[root@localhost pp_drv]# make
(cd /home/mobile/workspace/s3c-linux-2.6.24; make SUBDIRS=/home/mobile/Qt_samsung/Multimedia_DD/PP_V2.5/pp_drv modules)
make[1]: Entering directory `/home/mobile/workspace/s3c-linux-2.6.24'
  CC [M]  /home/mobile/Qt_samsung/Multimedia_DD/PP_V2.5/pp_drv/s3c_pp_common.o
  CC [M]  /home/mobile/Qt_samsung/Multimedia_DD/PP_V2.5/pp_drv/s3c_pp_6400.o
/home/mobile/Qt_samsung/Multimedia_DD/PP_V2.5/pp_drv/s3c_pp_6400.c: In function 's3c_pp_probe':
/home/mobile/Qt_samsung/Multimedia_DD/PP_V2.5/pp_drv/s3c_pp_6400.c:745: warning: passing argument 2 of 'request_irq' from incompatib
le pointer type
  LD [M]  /home/mobile/Qt_samsung/Multimedia_DD/PP_V2.5/pp_drv/s3c_pp.o
  Building modules, stage 2.
  MODPOST 1 modules
  CC      /home/mobile/Qt_samsung/Multimedia_DD/PP_V2.5/pp_drv/s3c_pp.mod.o
  LD [M]  /home/mobile/Qt_samsung/Multimedia_DD/PP_V2.5/pp_drv/s3c_pp.ko
make[1]: Leaving directory `/home/mobile/workspace/s3c-linux-2.6.24'
[root@localhost pp_drv]# ls
CVS       Module.symvers  s3c_pp.ko     s3c_pp.mod.o  s3c_pp_6400.c  s3c_pp_common.c  s3c_pp_common.o
Makefile  README          s3c_pp.mod.c  s3c_pp.o      s3c_pp_6400.o  s3c_pp_common.h
[root@localhost pp_drv]#
```

FIGURE . The post processor module compilation

Third, please do the following(At target Side). Insmod command must be used at target side.

```
/post/pp_drv $ ls
Makefile          s3c_pp.mod.o      s3c_pp_6400.o     s3c_pp_common.o
s3c_pp.ko         s3c_pp.o          s3c_pp_common.c
s3c_pp.mod.c      s3c_pp_6400.c     s3c_pp_common.h
/post/pp_drv $ insmod s3c_pp.ko
S3C PostProcessor Driver, (c) 2007 Samsung Electronics
 Success
```

FIGURE . Insert the module into the kernel

Now, kernel setup for S3C6400/6410 post processor is finished.

3 Test Post Processor Driver

In this Chapter, you will understand the following:

- Test Procedure for S3C6400/6410 Post Processor

3.1 Device node

Post Processor driver's node name is "s3c-pp".

Major number is 10.

Minor number is 253.

If your filesystem doesn't have "s3c-pp" nod, please make post processor's nod using below command

```
/ $ mknod s3c-pp 10 253
```

```
[root@localhost misc]# ll
total 0
crw-r--r-- 1 root root 10, 252 Jun 15 09:58 mfc
crwxrwxrwx 1 root root 10, 230 Jan  1  1970 modspk
crw-r--r-- 1 root root 10, 253 Jun 20 15:31 s3c-pp
[root@localhost misc]#
```

FIGURE . Post Processor device node

3.2 Test application

Usage is like below.

```
/ $ ./post_test
Check number of arguments!!!
Usage : [src_width] [src_height] [src_format] [dst_width] [dst_height] [dst_format] [out_path] [mode] [in file name] [out file name]

[src/dst_format] : 6(RGB16), 9(RGB24), 12(420YCbCr), 14(422YCBYCR)
                   15(422YCRYCB), 16(422CBYCRY), 17(422CRYCBY)
[out_path] : 0(DMA), 1(FIFO)
[mode] : 0(ONE-SHOT), 1(FREE-RUN)
```

FIGURE . Usage of the Post Processor

3.3 Test of the Post Processor

Execute post processor test application

./post_test 240 320 12 480 640 6 0 0 [input file name] [output file name]

```
/ $ ./post_test 240 320 12 480 640 6 0 0 sample1.yuv e.rgb
in_buf = 0x40097000
out_buf = 0x40497000
```

FIGURE . Execute the Post Processor test application