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ALPS MATV driver customization & application note

2011/06/27

History

Version	Owner	Note
V1.1	Charlie Lu	Draft
V1.2	Charlie Lu	Update Factory mode's customization
V1.3	Charlie Lu	1.Update 1048MP's customization 2.Add factory mode introduction in Appendix Chapter
V1.4	Ning Feng	Add mt657x platform customization and modify file structure

Agenda

- Basic Introduction
- Yusu MATV SW Customization
- MATV Factory Mode

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Basic Introduction





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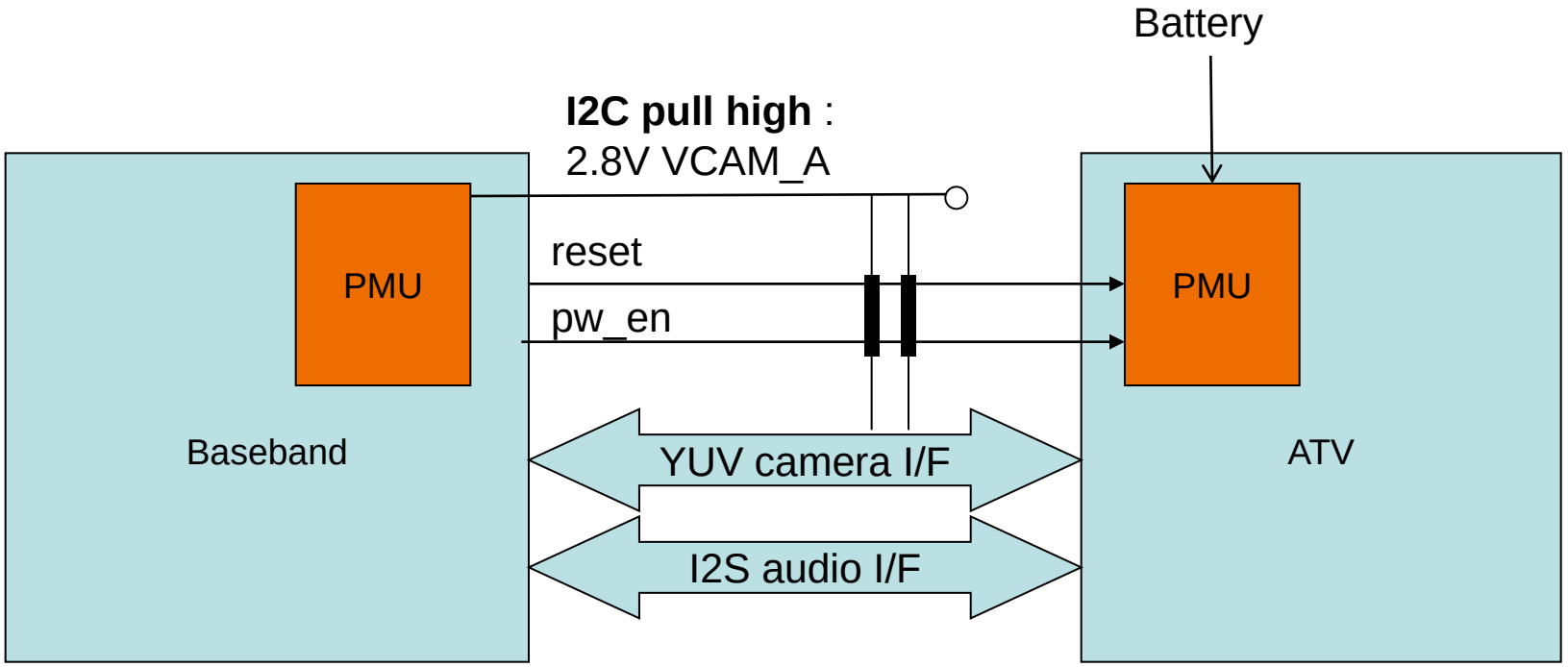
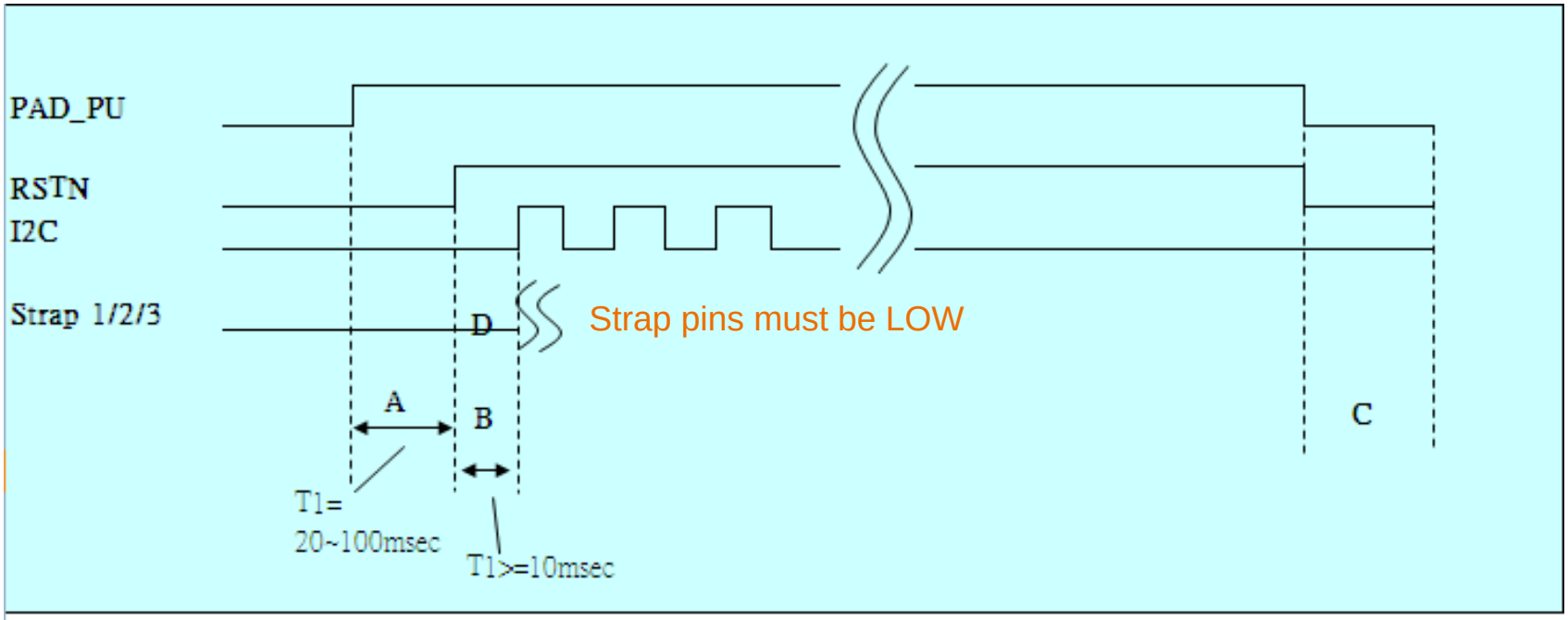
Functional Block



I2C, **VCAM_A** shared by camera and ATV

Power on seq.



PAD_PU:	MT5192's PMU EN
RSTN:	MT5192 reset signal
I2C:	I2C signal
Strap1/23:	MT5192 mode strap pin
	(Strap1: HREF, Strap2: VREF, Strap3: AODATA)

I2S_Data

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Yusu MATV SW Customization





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mATV Customization Summary

- MATV Customization Table
  - 1.Feature Configuration
  - 2.GPIO Setting(I2C/Rst/Pdn，VSYNC/HSYNC/I2S Data pin), 后面的3个pin，6516好像是dedicated的可以不用开放 (Done (Except I2C))
    - In 6516 I2S_DATA 可以是GPIO4 or GPIO27
  - 3.I2S GPIO Power On/Off (only for mt657x platform)
  - 4.Power 控制
  - 5.Channel table/country/Chip IO pad driving 客制化
  - 6.mATV video ISP data pin customization (only for mt657x platform)
  - 7.I2C Channel
  - 8.Audio PA
  - 9.Chip Co-clock cusotmizaiton (only for mt675x platform)
  - 10. mATV display delay time customization(only for MT657x platform)

Feature Configuration(1/3)

- 1032MP
  - Alps\mediatek\config\$(project)\projectconfig.mk

mATV Project Config	Description
CUSTOM_HAL_MATV # matv enable : CUSTOM_HAL_MATV = matv # matv disable: CUSTOM_HAL_MATV =	mATV hal customization folder
HAVE_MATV_FEATURE # matv enable: HAVE_MATV_FEATURE = yes # matv disable:HAVE_MATV_FEATURE = no	mATV feature control
MTK_ATV_CHIP = MTK_MT5192 #matv enable(mt5192 chip): MTK_ATV_CHIP = MTK_MT5192 #matv enable(mt5193 chip): MTK_ATV_CHIP = MTK_MT5193 # matv disable: MTK_ATV_CHIP =	mATV Chip definition

  - Kernel config
    - alps\kernel\config-mt6516-[$proj]
    - Enable: CONFIG_MATV_DRIVER=y
    - Disable: Remove CONFIG_MATV_DRIVER=y

Feature Configuration(2/3)

- 1048MP
  - Alps\mediatek\config\$(project)\projectconfig.mk

mATV Project Config	Description
CUSTOM_HAL_MATV # matv enable : CUSTOM_HAL_MATV = matv # matv disable: CUSTOM_HAL_MATV =	mATV hal customization folder
CUSTOM_KERNEL_MATV # matv enable(mt5192 chip): CUSTOM_KERNEL_MATV = mt5192 # matv enable(mt5193 chip): CUSTOM_KERNEL_MATV = mt5193 # matv disable: CUSTOM_KERNEL_MATV =	mATV kernel customization folder
HAVE_MATV_FEATURE # matv enable: HAVE_MATV_FEATURE = yes # matv disable:HAVE_MATV_FEATURE = no	mATV feature control
MTK_ATV_CHIP = MTK_MT5192 #matv enable(mt5192 chip): MTK_ATV_CHIP = MTK_MT5192 #matv enable(mt5193 chip): MTK_ATV_CHIP = MTK_MT5193 # matv disable: MTK_ATV_CHIP =	mATV Chip definition

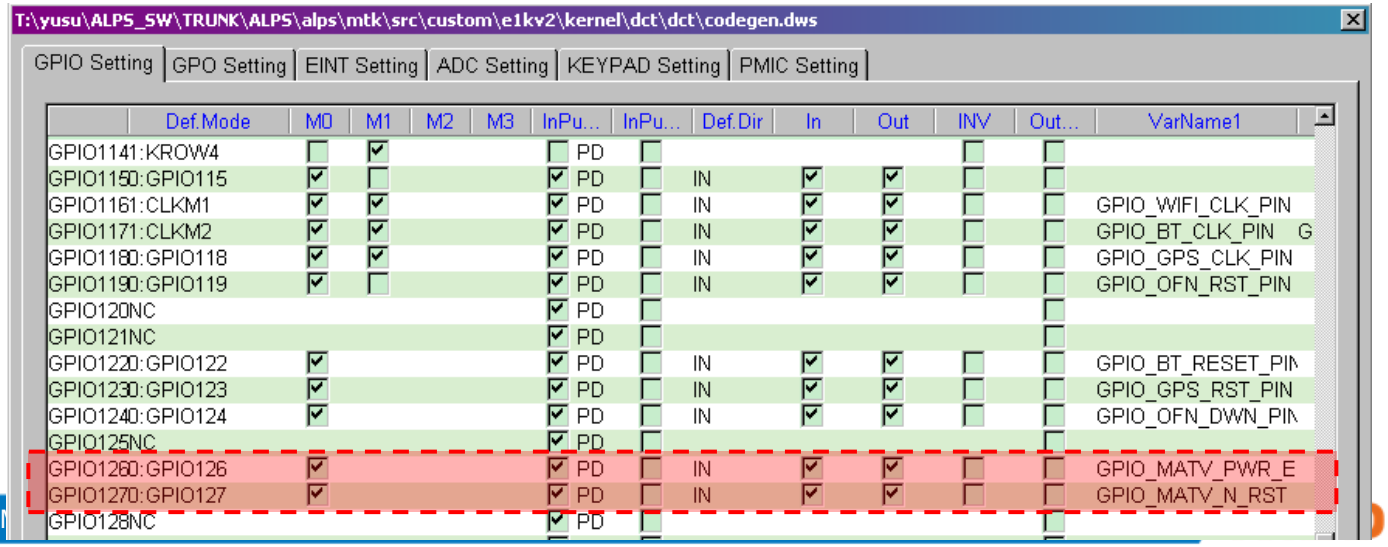
Feature Configuration(3/3)

- Mt657x platform
  - Alps\mediatek\config\$(project)\projectconfig.mk

mATV Project Config	Description
CUSTOM_HAL_MATV # matv enable : CUSTOM_HAL_MATV = matv # matv disable: CUSTOM_HAL_MATV =	mATV hal customization folder
CUSTOM_KERNEL_MATV # matv enable(mt5192 chip): CUSTOM_KERNEL_MATV = mt5192 # matv enable(mt5193 chip): CUSTOM_KERNEL_MATV = mt5193 # matv disable: CUSTOM_KERNEL_MATV =	mATV kernel customization folder
HAVE_MATV_FEATURE # matv enable: HAVE_MATV_FEATURE = yes # matv disable:HAVE_MATV_FEATURE = no	mATV feature control
MTK_ATV_CHIP = MTK_MT5192 #matv enable(mt5192 chip): MTK_ATV_CHIP = MTK_MT5192 #matv enable(mt5193 chip): MTK_ATV_CHIP = MTK_MT5193 # matv disable: MTK_ATV_CHIP =	mATV Chip definition
MTK_MATV_ANALOG_SUPPORT #matv enable(I2S audio path): MTK_MATV_ANALOG_SUPPORT = no #matv enalbe(analog audio path): MTK_MATV_ANALOG_SUPPORT = yes #matv disable: MTK_MATV_ANALOG_SUPPORT =	mATV audio path mode selection

GPIO Customization(1/2)

- Generate GPIO definition
  - 1032MP/1048MP
    - alps\mtk\src\dct\DrvGen.exe
  - Mt657x platform
    - alps\mediatek\source\dct\DrvGen.exe
  - Load alps\mtk\src\custom\[$proj]\kernel\dct\dct\codegen.dws
  - Edit **GPIO_MATV_PWR_E** and **GPIO_MATV_N_RST**



GPIO Customization(1/2)

- DCT Tool will generate
  - 1032MP/1048MP
    - alps\mtk\src\custom\[$proj]\kernel\dct\dct\cust_gpio_usage.h
  - Mt657x platform
    - alps\mtk\src\custom\[$proj]\kernel\dct\dct\cust_gpio_usage.h

```
#define GPIO_MATV_PWR_ENABLE          GPIO126
#define GPIO_MATV_PWR_ENABLE_M_GPIO   GPIO_MODE_00

#define GPIO_MATV_N_RST          GPIO127
#define GPIO_MATV_N_RST_M_GPIO   GPIO_MODE_00
```

I2S GPIO Power On/Off (for mt657x platform)(1/2)

- If the project use I2S audio path, the I2S GPIO need be customize use DCT tool too.
- If the project ‘s mt5192/mt5193 and mt6620 chip both use I2S audio path
  - Need use DCT tool to customize mt5192/mt5193 I2S GPIO and mt6620 GPIO.
    - Usually, I2S0 is used for mt5192/mt5193, I2S1 is used for mt6620
    - Need customize GPIO power on/off because only one GPIO Pad can be configured to I2S0 input mode.
    - I2S GPIO power on/off flow refers to the next slide.

I2S GPIO Power On/Off (for mt657x platform)(2/2)

- Alps\mediatek\custom\[$proj]\kernel\matv\mt519x\cust_matv.c

```
int cust_matv_gpio_on(void)
{
    MATV_LOGE("[MATV] mt5193 cust_matv_gpio_on Start\n");
    mt_set_gpio_mode(GPIO_I2S1_CK_PIN, GPIO_MODE_00);
    mt_set_gpio_dir(GPIO_I2S1_CK_PIN, GPIO_DIR_OUT);
    mt_set_gpio_out(GPIO_I2S1_CK_PIN, GPIO_OUT_ZERO);

    mt_set_gpio_mode(GPIO_I2S1_WS_PIN, GPIO_MODE_00);
    mt_set_gpio_dir(GPIO_I2S1_WS_PIN, GPIO_DIR_OUT);
    mt_set_gpio_out(GPIO_I2S1_WS_PIN, GPIO_OUT_ZERO);

    mt_set_gpio_mode(GPIO_I2S1_DAT_PIN, GPIO_MODE_00);
    mt_set_gpio_dir(GPIO_I2S1_DAT_PIN, GPIO_DIR_OUT);
    mt_set_gpio_out(GPIO_I2S1_DAT_PIN, GPIO_OUT_ZERO);

    mt_set_gpio_mode(GPIO_I2S0_CK_PIN, GPIO_I2S0_CK_PIN_M_I2S0_CK);
    mt_set_gpio_mode(GPIO_I2S0_DAT_PIN, GPIO_I2S0_DAT_PIN_M_I2S0_DAT);
    mt_set_gpio_mode(GPIO_I2S0_WS_PIN, GPIO_I2S0_WS_PIN_M_I2S0_WS);
}

int cust_matv_gpio_off(void)
{
    MATV_LOGE("[MATV] mt5193 cust_matv_gpio_off Start\n");
    mt_set_gpio_mode(GPIO_I2S0_CK_PIN, GPIO_MODE_00);
    mt_set_gpio_mode(GPIO_I2S0_WS_PIN, GPIO_MODE_00);
    mt_set_gpio_mode(GPIO_I2S0_DAT_PIN, GPIO_MODE_00);

    mt_set_gpio_dir(GPIO_I2S0_CK_PIN, GPIO_DIR_OUT);
    mt_set_gpio_out(GPIO_I2S0_CK_PIN, GPIO_OUT_ZERO);
    mt_set_gpio_dir(GPIO_I2S0_WS_PIN, GPIO_DIR_OUT);
    mt_set_gpio_out(GPIO_I2S0_WS_PIN, GPIO_OUT_ZERO);
    mt_set_gpio_dir(GPIO_I2S0_DAT_PIN, GPIO_DIR_OUT);
    mt_set_gpio_out(GPIO_I2S0_DAT_PIN, GPIO_OUT_ZERO);
}
```

These two functions are only for mt519x and mt6620 both use I2S path. otherwise, please do not implement it.

1. Disable mt6620 I2S GPIO
2. Enable mt519x I2S GPIO

Disable mATV mt519x I2S GPOI

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Power Customization(only for mt657x platform)

- Alps\mediatek\custom\[$proj]\kernel\matv\mt519x\cust_matv.c
  - Cust_matv_power_on
    - Supply power to I2C and ISP bus
    - Shutdown camera main and sub sensor
  - Cust_matv_power_off
    - Shutdown I2C and ISP bus power.

```
int cust_matv_power_on(void)
{
    xxxx

}

int cust_matv_power_off(void)
{
    xxxx
}
```

- Customization ISP IO voltage level. Usually, it is not need modify.
  - Alps\mediatek\custom\[$proj]\kernel\matv\mt519x\cust_matv_common.h: if defined CMERA_IO_DRV_1800, ISP IO voltage level is 1800mv and mt519x IO driving will auto enlarged, otherwise it is 2800mv.


```
#define CAMERA_IO_DRV_1800
```

Channel table/country/Chip IO pad driving 客制化

- In 1032MP/1048MP
  - alps\mtk\src\custom\[$proj]\hal\matv\matv\mATVdrv_chtable.c
- In mt657x platform
  - alps\mediatek\custom\[$proj]\hal\matv\matv\mATVdrv_cust.c

By default, some countries are supported. If not, please consult for MediaTek.

```
const struct chscan_method ChCountryTab[]=
{
    {"West EU(PAL-BG)",BG_LIKE,SV_A2_BG,SV_CS_PAL,1, WE_AIR },
    {"West EU(PAL-DK)",DK_LIKE,SV_A2_DK1,SV_CS_PAL,1, WE_AIR },
    {"East EU(PAL-DK)",DK_LIKE,SV_A2_DK1,SV_CS_PAL,1, RU_AIR },
    {"Russia(SECAM-DK)",DK_LIKE,SV_PAL_DK,SV_CS_SECAM,1, RU_AIR },
    {"UK(PAL-I)",I_LIKE,SV_PAL_I,SV_CS_PAL,1, UK_AIR },
    XXXXX
    //{"GA",GA_LIKE,SV_A2_BG,SV_CS_AUTO,0,NA_AIR},
};
```

Usually, Customer need not modify the IO driving capability.. If IO driving is not enough, please modify here.

```
void  matv_module_power_on(void)
{
    xxxx
#ifdef CAMERA_IO_DRV_1800
  DrvSetChipDep(MTK_PAD_DRIVING,0x02);
  DrvSetChipDep(MTK_PAD_DRIVING,0x12);
  DrvSetChipDep(MTK_PAD_DRIVING,0x22);
  DrvSetChipDep(MTK_PAD_DRIVING,0x32);
  DrvSetChipDep(MTK_PAD_DRIVING,0x42);
  DrvSetChipDep(MTK_PAD_DRIVING,0x52);
  DrvSetChipDep(MTK_PAD_DRIVING,0x62);
  DrvSetChipDep(MTK_PAD_DRIVING,0x72);
  DrvSetChipDep(MTK_PAD_DRIVING,0x82);
  DrvSetChipDep(MTK_PAD_DRIVING,0x92);
  DrvSetChipDep(MTK_PAD_DRIVING,0xa2);
  DrvSetChipDep(MTK_PAD_DRIVING,0xb2);
#else

#endif

} ? end matv_module_power_on ?
```

I2C Channel Customization

- Usually, customer should not change mt5192/mt5193 I2C channel. Especially, other I2C device should not mount to the I2C which is same to mt5192's I2C channel.
- If customer changed the mt5192/mt5193 I2C channel, please modify the define:
  - 1032MP/1048MP:
    Alps\mtk\src\custom\[$proj]\kernel\matv\mt519x\cust_matv.h
  - Mt657x platform:
    Alps\mediatek\custom\[$proj]\kernel\matv\mt519x\cust_matv.h

```
#define MATV_I2C_CHANNEL      (1)        //I2C Channel 1
```

Audio PA Customization

- Audio PA can be Class D or Class AB. Class AB and Class D's power on timing is not same, if do not customize, the audio will be delayed 140ms power on after outputting video.
- 1032MP/1048MP:
  - Alps\external\mediatek\audiosetting\audiosetting.cpp
- Mt657x platform
  - Alps\mediatek\external\audiosetting\audiosetting.cpp

```
#ifdef USING_CLASS_AB_AMP
const int using_class_ab_amp = 1;
#else
const int using_class_ab_amp = 0;
#endif
```


MT6573 mATV video ISP Customization(for mt657x platform)

- mATV data pin has 10 lines， the data pin of EVB project is connected to Bit2~Bit9, while phone project is connected to Bit0~Bit7.
- If data pin is not match, the playback will be shown pink or green
- The isp data pin customization:
  /alps/mediatek/custom/$(custmer project)
  /hal/camera/camera/cfg_tuning_mt6573.h

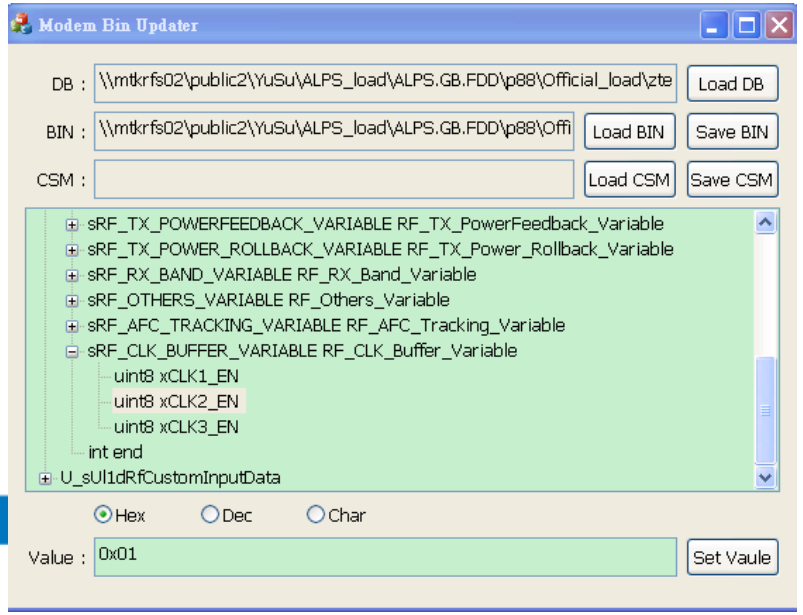
```
MINT32 get_atv_input_data()
{
    MINT32 AtvInputdata = 0;
    return AtvInputdata;
}
```

AtvInputdata = 1 means bit 0~7 as input (phone project default)
AtvInputdata = 0 means bit 2~9 as input (EVB project default)

Chip Co-clock Customization (only for mt675x platform)

- In mt6573 platform, mATV chip clock can be supplied by:
  - External crystal
  - Mt657x's RF chip (by default design, RF do not output clock for low power consumption. But please make sure that RF chip is mt6162. otherwise, co-clock can't be enable.)
- In mt6575 platform, co-clock is default design.
- Co-clock enable flow using MBC tool:

  Step1: Load the database
  Step2: Load the modem bin file (modem.img)
  Step3: Select the CLK_Buffer variable
  Step4: Type the value
  1: Enable the clock buffer
  0: Disable the clock buffer
  Step5: Set the value
  Step6: Save the modem bin file
  Step7: Download the modem bin file again



mATV display delay time customization (1/2)

- The data transmission of mATV and LCD may be interfered with each other, which will cause that mATV preview show mesh point. To resolve the Interference, the mATV preview frame should delay a fixed time before showing it.
- The mATV display delay time customization:
  /alps/mediatek/custom/common/hal/inc/camera_costom_if.h

```
/*************************************
* mAtv disp delay time
*************************************

#define ATV_MODE_NTSC 30000
#define ATV_MODE_PAL  25000

#ifdef MTK_MT5192
//unit: us
#define ATV_MODE_NTSC_DELAY 5000
#define ATV_MODE_PAL_DELAY  10000

#else
#ifdef MTK_MT5193
//unit: us
#define ATV_MODE_NTSC_DELAY 13000
#define ATV_MODE_PAL_DELAY  20000
#else
//unit: us
#define ATV_MODE_NTSC_DELAY 0
#define ATV_MODE_PAL_DELAY  0
#endif
```

For chip MT5192

For chip MT5193

For others

mATV display delay time customization (2/2)

- In mt6575 platform, the mATV delay time be able to modify at runtime. This is to quickly determine the delay time (without build load). After get the delay time, you should change the delay time definition in custom file camera_costom_if.h
- In shell use command: *setprop atv.disp.delay <value>*
- Description:
  - value: the delay time you set, unit us.
  - value =- 1 (default value), means that get delay time from file camera_costom_if.h
  - value = other illegal value , delay time is set to 0us.
  - This log show the actual delay time: *atv display real delay time is% dus*

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MATV Factory Mode

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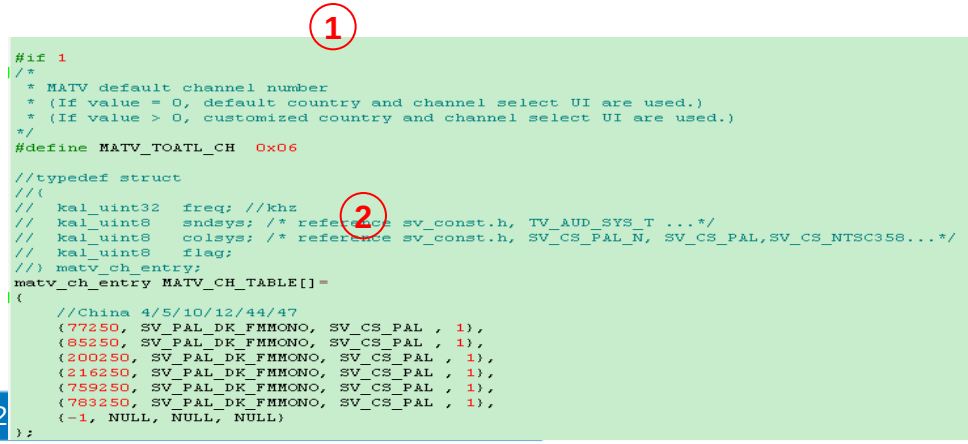
Introduction

- MATV Factory Mode provide customers two modes to do functional tests
  - Select country first, then use all channel lists (identical to android)
  - Default channel list mode
- How to switch between two modes?
  - In 1032MP
    - alps\bootable\factory\custom\[$proj]\inc\cust_matv.h
  - In 1048MP
    - alps\mtk\src\custom\[$proj]\factory\inc\cust_matv.h
  - In mt657x platform
    - alps\mediatek\custom\[$proj]\factory\inc\cust_matv.h

```
92 /*
93  * MATV default channel number
94  * (If value = 0, default country and channel select UI are used.)
95  * (If value > 0, customized country and channel select UI are used.)
96 */
97 #define MATV_TOATL_CH  0x06
```

Customization (1/2)

- Source directory
  - In 1032MP
    - alps\bootable\factory\custom\[$proj]\inc\cust_matv.h
  - In 1048MP
    - alps\mtk\src\custom\[$proj]\factory\inc\cust_matv.h
  - In mt657x platform
    - alps\mediatek\custom\[$proj]\factory\inc\cust_matv.h
- Details
  - 1.default channel number
  - 2.channel parameters

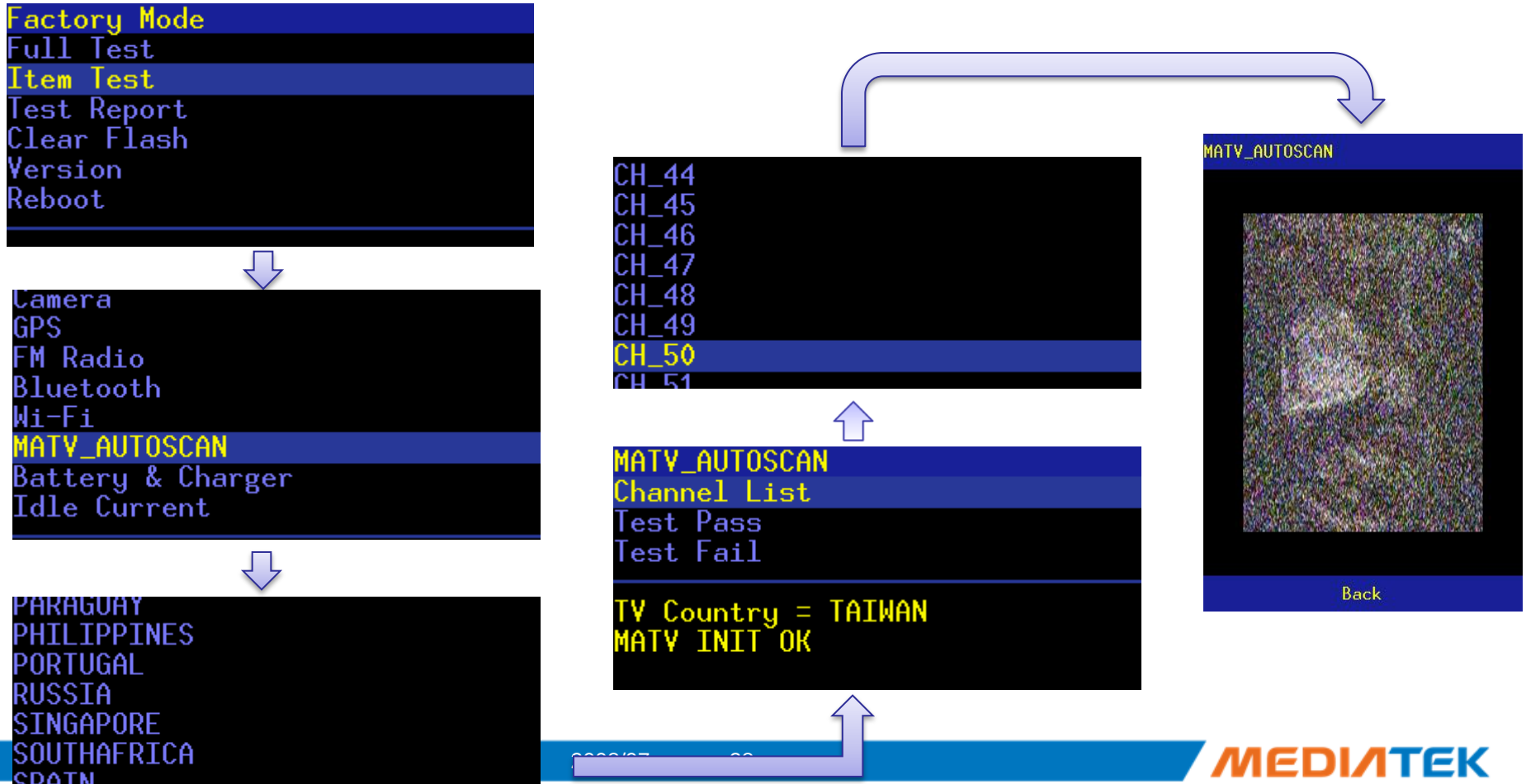


Customization (2/2)

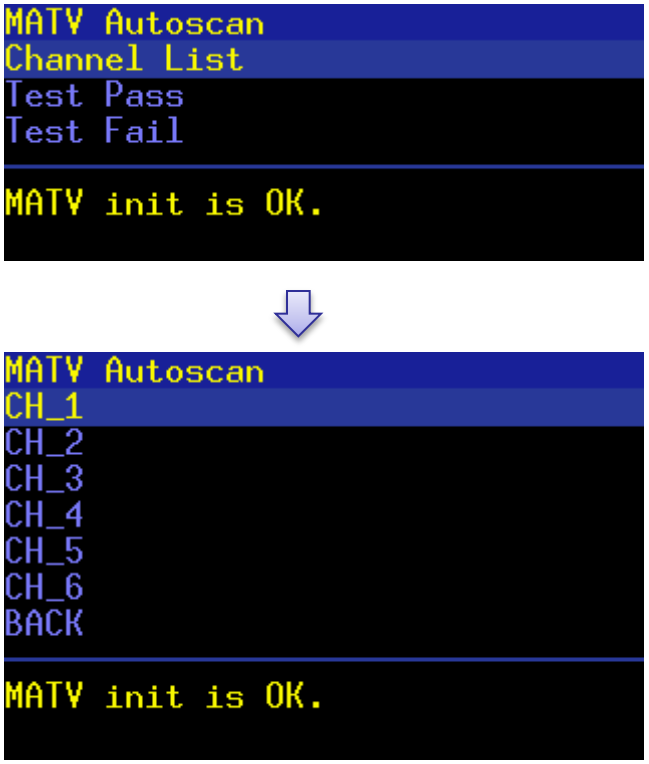
- In 1048MP/mt675x platorm, Factory mode's switch is also controlled by HAVE_MATV_FEATURE

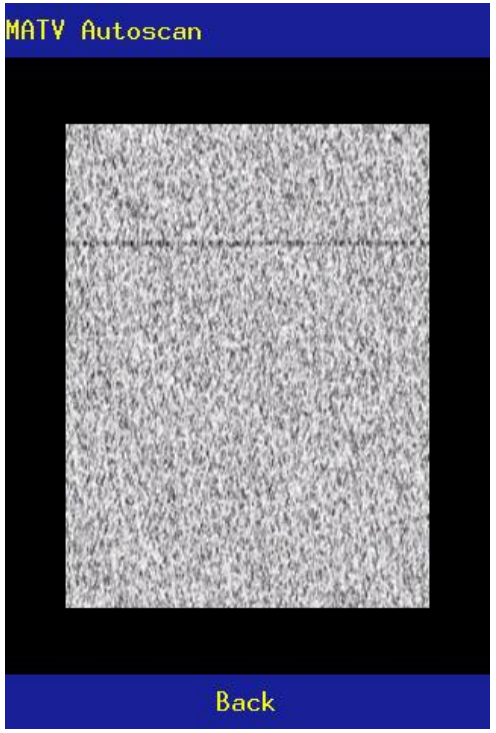
Case 1

- MATV Factory mode UI Flow



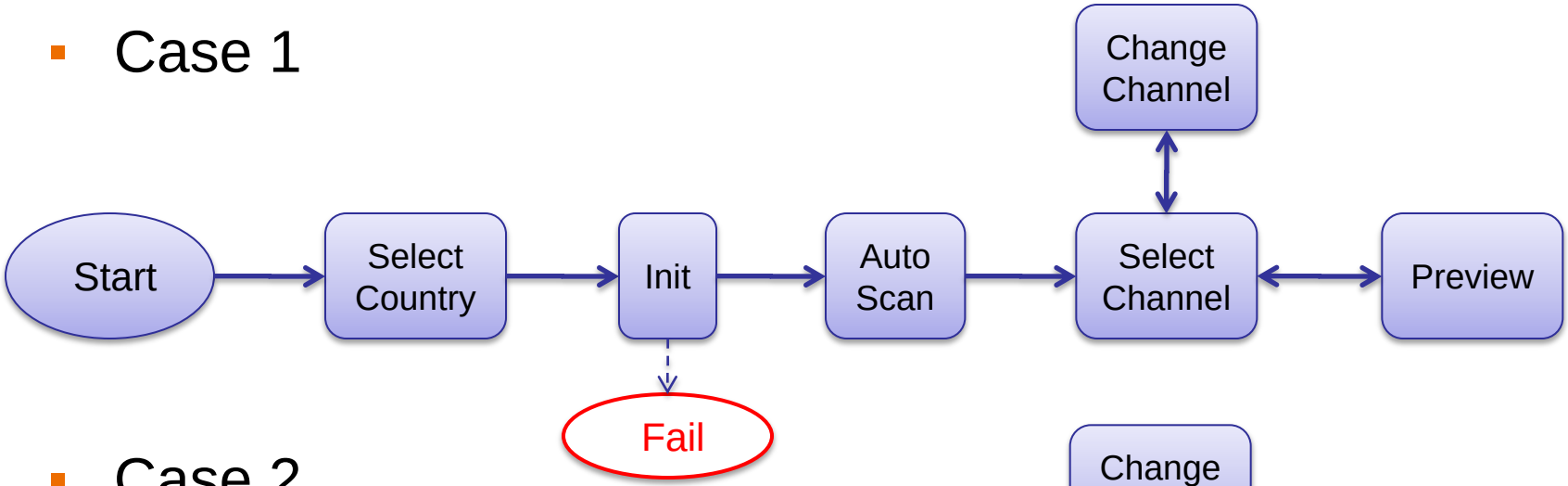
Case 2:



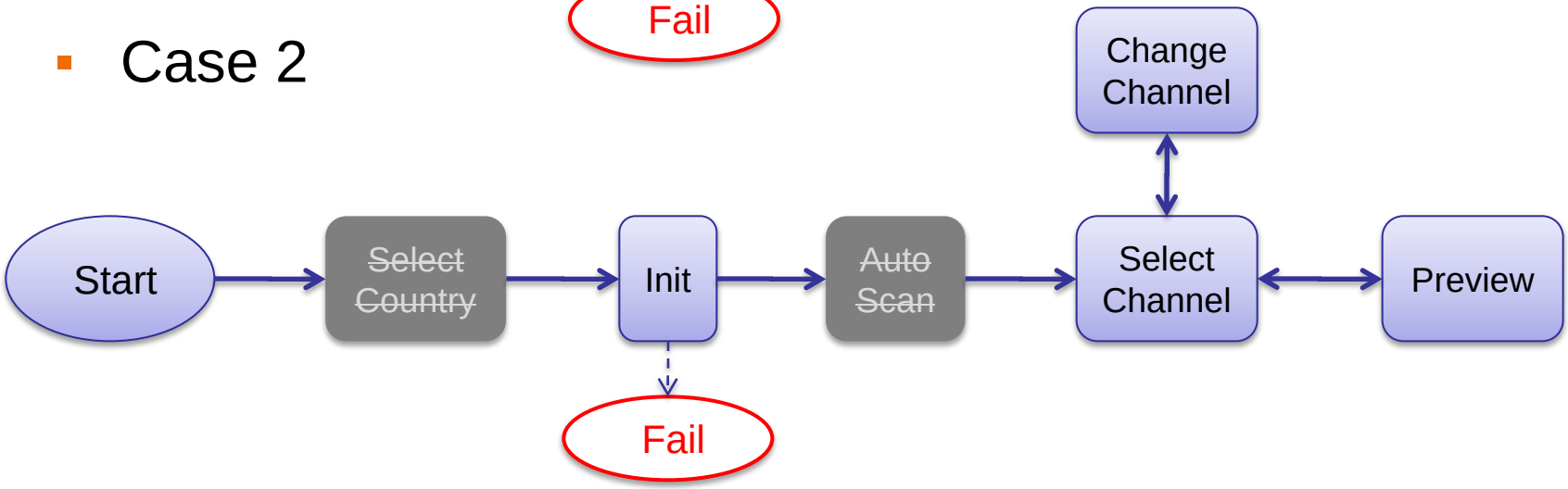


Flow cht

- Case 1



- Case 2



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