

GM8136

SAR ADC

User Guide

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Chapter 1

Introduction

This chapter contains the following sections:

- 1.1 SAR ADC Overview
- 1.2 SAR ADC Basic Usages
- 1.3 Reference

1.1 SAR ADC Overview

Because software can only handle discrete digital signals, all analog signals are required to be translated into this form. SAR (Successive Approximation) ADC provides a method to convert the analog signals into the digital signals. Grain Media uses this common technology to acquire the ADC values for the keypad, battery detection, and Plug-In or Plug-Out of the CVBS signals.

GM8139 implements the SAR ADC technology to detect the keypad input, battery voltage, and CVBS signals. Users can refer to the GM8139 data sheet for more detailed information for the register settings of SAR ADC. By inserting the kernel module provided by Grain Media, users can acquire the ADC values via the corresponding device file described in the following section.

1.2 SAR ADC Basic Usages

The Linux kernel does not provide the driver middleware for ADC. Grain Media uses the basic characteristics of the device driver for implementation; therefore, users will not need to set any option in kernel.

The SAR ADC driver supports three running options. One is the keypad (0x01), the other is the battery voltage (0x02), and another is the CVBS signals (0x04). If users only run CVBS signal detection, please input `"insmod sar_adc.ko run_mode=0x04"`. If users run the keypad and battery voltage detection, please input `"insmod sar_adc.ko run_mode=0x03"`. The default running mode is "all". Users should insert the precompiled kernel module and generate the device file as shown in Figure 1-1.

The SAR ADC driver supports the keypad interrupt limited range. For example, users insert the SAR ADC module as `"Insmod sar_adc.ko gain0_lim=0xe6,0xe8 (low value, high value)"`, it means that if the value is below 0xe6 and above 0xe8, it will trigger the interrupt.


```

/lib/modules # insmod sar_adc.ko run_mode=0x7
Welcome to use sar_adc_drv
* module_init_func
* register_driver
* driver_probe
dev_data_alloc_specific done
set_pinmux set as 0xB8 0xFFEC7638 OK * register_cdev
driver_probe done, io_vadr 0x90C76000, io_padr 0x90A00000 0x832433E0
/lib/modules # mdev -s
/lib/modules # ls -al /dev/sar_adc_drv
crw-rw----  1 root    root      253,   0 Jan  1 00:00 /dev/sar_adc_drv
/lib/modules #

```

Figure 1-1. Kernel Module Insertion and Device File Generation

sar_adc.ko is the SAR ADC driver module. The device file in /dev/sar_adc_drv contains the physical devices based on SAR ADC. Users can acquire the ADC values by reading this file. Please refer to SAR_ADC/test for a demo program of the keypad detection function. The demo program will detect whether the keypad is pressed. It will show the returned value, which indicates the pushed button. The demo program will also detect the change of the battery voltage. If the KEY ADC status is 4, it means that the keypad is pushed. If the KEY ADC status is 8, it means that the voltage is changed. On the other hand, the SAR ADC driver will automatically detect the CVBS signals to turn off components in order to save power.

The SAR ADC driver module provides repeat duration setting to prevent keypad from repeating inputs. The unit is millisecond. The ioctl parameter is "SAR_ADC_KEY_SET_REPEAT_DURATION".

```

Start SAR ADC Keypad Test
AP get KEY ADC status =4 val = e7
AP get KEY ADC status =4 val = e7
AP get KEY ADC status =8 val = 11
AP get KEY ADC status =8 val = 1
AP get KEY ADC status =8 val = 4

```

1.3 Reference

- `arm-linux-3.3/module/SAR_ADC/`

All needed information is located in this directory, which contains the kernel module implementation and test program for the user space.