

密级状态：绝密() 秘密() 内部资料() 公开(√)

RK817_RK809_Codec 开发指南

(技术部，第二系统产品部)

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1 概述

RK817/RK809 内置 codec 是高性能音频编解码器:

High performance Audio CODEC

- One internal PLL
- Support microphone input
- Support I2S as the digital signal interface for both DAC and ADC
- Support Automatic Level Control(ALC),limiter and noise gating
- Support programmable digital and analog gains
- Audio resolution from 16bits to 32bits
- Sample rate up to 192KHz
- Provides master and slave work mode, software configurable
- Support 3 I2S formats (normal, left-justified, right-justified)
- Support PDM mode(external input PCLK)

实地输出的耳机驱动输出

不需要外部滤波电感的 1.3W class-D 音频功放

2 代码路径

```
sound/soc/codecs/rk817_codec.c
```

```
sound/soc/codecs/rk817_codec.h
```

3 dts 配置

3.1 dts 解析

Documentation/devicetree/bindings/sound/rockchip,rk817-codec.txt

- compatible: "rockchip,rk817-codec"

- clocks: a list of phandle + clock-specifier pairs, one for each entry in

clock-names.

- clock-names: should be "mclk".

- spk-ctl-gpios: spk mute enable/disable

用于外置功放使能脚，如果产品上有使用外置功放，请配置对应的使能脚

- hp-ctl-gpios: hp mute enable/disable

- spk-mute-delay-ms: spk mute delay time

- hp-mute-delay-ms: hp mute delay time

- spk-volume: DAC L/R volume digital setting for Speaker

配置喇叭输出音量，0 最大，255 最小

- hp-volume: DAC L/R volume digital setting for Headphone

配置耳机输出音量，0 最大，255 最小

*

* DDAC L/R volume setting

* 0db~-95db,0.375db/step,for example:

* 0: 0dB

* 10: -3.75dB

* 125: -46dB

* 255: -95dB

*

- capture-volume: ADC L/R volume digital setting for Microphone

配置录音输入音量，0 最大，255 最小

*

* DADC L/R volume setting

* 0db~-95db,0.375db/step,for example:

* 0: 0dB

* 10: -3.75dB

* 125: -46dB

* 255: -95dB

*

- mic-in-differential:

Boolean. Indicate MIC input is differential, rather than single-ended.

指定使用差分 MIC，否则为单端 MIC，所以使用差分 MIC 时加上此 property。

- pdmdata-out-enable:

Boolean. Indicate pdmdata output is enabled or disabled.

录音数据使用 PDM 数字接口。

- use-ext-amplifier:

Boolean. Indicate use external amplifier or not. 指定是否使用外部功放。

- adc-for-loopback:

Boolean. Indicate adc use for loopback or not.

指定 ADC 用于回采，一般音箱类产品使用。

3.2 rk817-codec 参考

arch/arm64/boot/dts/rockchip/rk3326-863-lp3-v10.dts

声卡的 dai_link 使用 simple-card framework，其 dts 配置：

```
rk817-sound {
    compatible = "simple-audio-card";
    simple-audio-card,format = "i2s";
    simple-audio-card,name = "rockchip,rk817-codec";
    simple-audio-card,mclk-fs = <256>;
    simple-audio-card,widgets =
        "Microphone", "Mic Jack",
        "Headphone", "Headphone Jack";
    simple-audio-card,routing =
        "Mic Jack", "MICBIAS1",
        "IN1P", "Mic Jack",
        "Headphone Jack", "HPOL",
        "Headphone Jack", "HPOR";
    simple-audio-card,cpu {
        sound-dai = <&i2s1_2ch>;
    };
    simple-audio-card,codec {
        sound-dai = <&rk817_codec>;
    };
};
```

声卡的 cpu_dai 部分，如使用的是 i2s1，则将其 okay:

```
&i2s1_2ch {
    status = "okay";
    #sound-dai-cells = <0>;
};
```

声卡的 codec_dai 部分即 codec driver，使用内置 class-D 音频功放，其 dts 配置：

```
rk817_codec: rk817-codec {
    #sound-dai-cells = <0>;
    compatible = "rockchip,rk817-codec";
    clocks = <&cru SCLK_I2S1_OUT>;
    clock-names = "mclk";
    pinctrl-names = "default";
    pinctrl-0 = <&i2s1_2ch_mclk>;
    spk-volume = <3>;
    hp-volume = <3>;
    mic-in-differential;
    status = "okay";
};
```

3.3 rk809-codec 参考

arch/arm64/boot/dts/rockchip/px30-evb-ddr3-v10.dts

声卡的 dai_link 使用 simple-card framework, 其 dts 配置:

```
rk809-sound {
    compatible = "simple-audio-card";
    simple-audio-card,format = "i2s";
    simple-audio-card,name = "rockchip,rk809-codec";
    simple-audio-card,mclk-fs = <256>;
    simple-audio-card,widgets =
        "Microphone", "Mic Jack",
        "Headphone", "Headphone Jack";
    simple-audio-card,routing =
        "Mic Jack", "MICBIAS1",
        "IN1P", "Mic Jack",
        "Headphone Jack", "HPOL",
        "Headphone Jack", "HPOR";
    simple-audio-card,cpu {
        sound-dai = <&i2s1_2ch>;
    };
    simple-audio-card,codec {
        sound-dai = <&rk809_codec>;
    };
};
```

声卡的 cpu_dai 部分, 如使用的是 i2s1, 则将其 okay:

```
&i2s1_2ch {
    status = "okay";
    #sound-dai-cells = <0>;
};
```

声卡的 codec_dai 部分即 codec driver, 其 dts 配置:

```
rk809_codec: codec {
    #sound-dai-cells = <0>;
    compatible = "rockchip,rk809-codec", "rockchip,rk817-codec";
    clocks = <&cru SCLK_I2S1_OUT>;
    clock-names = "mclk";
    pinctrl-names = "default";
    pinctrl-0 = <&i2s1_2ch_mclk>;
    hp-volume = <20>;
    spk-volume = <3>;
    status = "okay";
};
```

3.4 音箱类产品，如使用了外部功放、PDM 输出、回采，参考

arch/arm64/boot/dts/rockchip/rk3326-evb-ai-va-v11.dts

声卡的 dai_link 使用 simple-card framework，其 dts 配置：

```
rk809-sound {
    compatible = "simple-audio-card";
    simple-audio-card,name = "rockchip,rk809-codec";
    simple-audio-card,mclk-fs = <256>;
    simple-audio-card,widgets =
        "Microphone", "Mic Jack",
        "Headphone", "Headphone Jack";
    simple-audio-card,routing =
        "Mic Jack", "MICBIAS1",
        "IN1P", "Mic Jack",
        "Headphone Jack", "HPOL",
        "Headphone Jack", "HPOR";
    simple-audio-card,dai-link@0 {
        format = "i2s";
        cpu {
            sound-dai = <&i2s1_2ch>;
        };
        codec {
            sound-dai = <&rk809_codec 0>;
        };
    };
    simple-audio-card,dai-link@1 {
        format = "pdm";
        cpu {
            sound-dai = <&pdm>;
        };
        codec {
            sound-dai = <&rk809_codec 1>;
        };
    };
};
```

声卡的 cpu_dai 部分，如使用的是 i2s1 用于播放，则将其 okay:

```
&i2s1_2ch {
    status = "okay";
    #sound-dai-cells = <0>;
    pinctrl-0 = <&i2s1_2ch_sclk
                &i2s1_2ch_lrck
                &i2s1_2ch_sdo>;
};
```

录音使用 PDM 接口，将其 okay:

```
&pdm {
    status = "okay";
    #sound-dai-cells = <0>;
    pinctrl-names = "default";
    pinctrl-0 = <&pdm_clk0m1
                &pdm_clk1
                &pdm_sdi0m1
                &pdm_sdi1
                &pdm_sdi2
                &pdm_sdi3>;
};
```

声卡的 codec_dai 部分即 codec driver，其 dts 配置：


```
rk809_codec: codec {
    #sound-dai-cells = <1>;
    compatible = "rockchip,rk809-codec", "rockchip,rk817-codec";
    clocks = <&cru SCLK_I2S1_OUT>;
    clock-names = "mclk";
    pinctrl-names = "default";
    pinctrl-0 = <&i2s1_2ch_mclk>;
    pdmdata-out-enable;
    use-ext-amplifier;
    adc-for-loopback;
    spk-ctl-gpios = <&gpio3 RK_PB2 GPIO_ACTIVE_HIGH>;
    hp-volume = <20>;
    spk-volume = <20>;
};
```

4 调试 log 开关

```
cd /sys/module/snd_soc_rk817/parameters/
```

```
echo 1 > dbg_level
```

或者将对应驱动 sound/soc/codecs/rk817_codec.c 中调试变量初始化为 1:

```
static int dbg_enable = 1;
```

5 查看 codec 寄存器

```
rk3326_evb:/ # cd /d/regmap/0-0020-rk817-codec/
```

```
rk3326_evb:/d/regmap/0-0020-rk817-codec # cat registers
```