RALINK TECHNOLOGY, CORP.

RALINK Auto-Frequency and Power Save Application Note

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Content

1. Introduction

The RT3352/RT5350 SOC has the capability of auto-frequency and power saving.

● CPU Auto-Frequency (RT3352/RT5350)

● SDR Power Pre-charge Power Down (RT3352/RT5350)

● DDR self Refresh Power Save (RT3352)

Notice: Those new features are supported by SDK 3.5.2.0 or following version.

2. Setup

2.1 How to turn on CPU Auto-Frequency

For RT3352/RT5350, We can turn on CPU auto frequency function by

1. Modifying config.mk in Uboot and rebuild uboot firmware

```
…
RALINK_DDR_CONTROLLER_OPTIMIZATION = OFF
RALINK_CPU_AUTO_FREQUENCY = ON
RALINK_SDR_PRECHARGE_POWER_DOWN = OFF
RALINK_DDR_SELF_REFRESH_POWER_SAVE_MODE = OFF
…
```

$make

2. Set Linux Kernel Configuration and then rebuild linux firmware

$make menuconfig --->

   Machine selection   ---> [*] Ralink External Timer

……………………………………………………………………………………………

$make dep; make

2.2 How to turn on SDR Pre-charge Power Down

For RT3352/RT5350, We can turn on SDR power save by

1. Modifying config.mk in Uboot and rebuild uboot firmware

```
…
RALINK_DDR_CONTROLLER_OPTIMIZATION = OFF
RALINK_CPU_AUTO_FREQUENCY = OFF
RALINK_SDR_PRECHARGE_POWER_DOWN = ON
RALINK_DDR_SELF_REFRESH_POWER_SAVE_MODE = OFF
…
```

$make

2.3 How to turn on DDR Self Refresh Power Save

For RT3352 , We can turn on DDR power save by

1. Modifying config.mk in Uboot and rebuild uboot firmware

...

RALINK_DDR_CONTROLLER_OPTIMIZATION = OFF

RALINK_CPU_AUTO_FREQUENCY = OFF

RALINK_SDR_PRECHARGE_POWER_DOWN = OFF

RALINK_DDR_SELF_REFRESH_POWER_SAVE_MODE = ON

...

$make

3. Check Function

You can check if those functions are enabled or disabled by register.

- CPU Auto-Frequency

    Turn off:

    ```
    #
    # reg s b0000000
    switch register base addr to 0xb0000000
    # reg r 40
    0x34501
    #
    ```

    Turn on:

    ```
    # reg s b0000000
    switch register base addr to 0xb0000000
    # reg r 40
    0x80035f41
    #
    ```

- SDR Pre-charge Power Save

    Turn off:

    ```
    # reg s b0000300
    switch register base addr to 0xb0000300
    # reg r 1c
    0x3ffff
    # reg r 4
    0xe1110600
    #
    ```

    Turn on:

    ```
    # reg s b0000300
    switch register base addr to 0xb0000300
    # reg r 1c
    0x1
    # reg r 4
    0xf1110600
    #
    ```

- DDR Self Refresh Power Save

    Turn off:

    ```
    # reg s b0000300
    switch register base addr to 0xb0000300
    # reg r 1c
    0x3ffff
    # reg r 18
    0x3
    #
    ```

    Turn on:

    ```
    # reg s b0000300
    switch register base addr to 0xb0000300
    # reg r 1c
    0x6d000001
    # reg r 18
    0x13
    #
    ```