

# Kernel driver exynos\_tmu

Supported chips:

- ARM Samsung Exynos4, Exynos5 series of SoC

Datasheet: Not publicly available

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## TMU controller Description:

This driver allows to read temperature inside Samsung Exynos4/5 series of SoC.

The chip only exposes the measured 8-bit temperature code value through a register. Temperature can be taken from the temperature code. There are three equations converting from temperature to temperature code.

The three equations are:

- Two point trimming:

$$T_c = (T - 25) * (TI2 - TI1) / (85 - 25) + TI1$$

- One point trimming:

$$T_c = T + TI1 - 25$$

- No trimming:

$$T_c = T + 50$$

Tc:

Temperature code, T: Temperature,

TI1:

Trimming info for 25 degree Celsius (stored at TRIMINFO register) Temperature code measured at 25 degree Celsius which is unchanged

TI2:

Trimming info for 85 degree Celsius (stored at TRIMINFO register) Temperature code measured at 85 degree Celsius which is unchanged

TMU(Thermal Management Unit) in Exynos4/5 generates interrupt when temperature exceeds pre-defined levels. The maximum number of configurable threshold is five. The threshold levels are defined as follows:

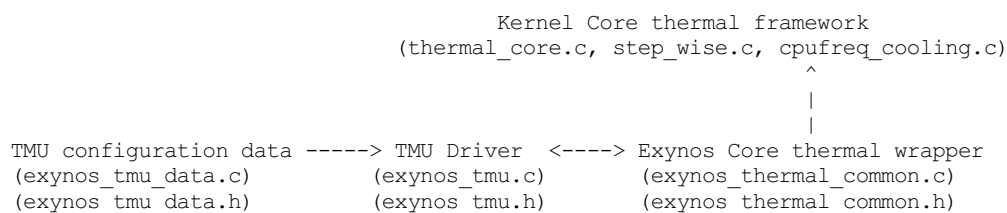
```
Level_0: current temperature > trigger_level_0 + threshold
Level_1: current temperature > trigger_level_1 + threshold
Level_2: current temperature > trigger_level_2 + threshold
Level_3: current temperature > trigger_level_3 + threshold
```

The threshold and each trigger\_level are set through the corresponding registers.

When an interrupt occurs, this driver notify kernel thermal framework with the function exynos\_report\_trigger. Although an interrupt condition for level\_0 can be set, it can be used to synchronize the cooling action.

## TMU driver description:

The exynos thermal driver is structured as:



- TMU configuration data:

This consist of TMU register offsets/bitfields described through structure exynos\_tmu\_registers. Also several other platform data (struct exynos\_tmu\_platform\_data) members are used to configure the TMU.

- TMU driver:

This component initialises the TMU controller and sets different thresholds. It invokes core thermal implementation with the call exynos\_report\_trigger.

- Exynos Core thermal wrapper:

This provides 3 wrapper function to use the Kernel core thermal framework. They are `exynos_unregister_thermal`, `exynos_register_thermal` and `exynos_report_trigger`.