KBA-170919235359

Add thermistor in PM for thermal tuning

Applicable platform:

MSM8953, MSM8952, MSM8996, MSM8998,SDM660,SDM630,SDM450 / Generic

Issue/problem description:

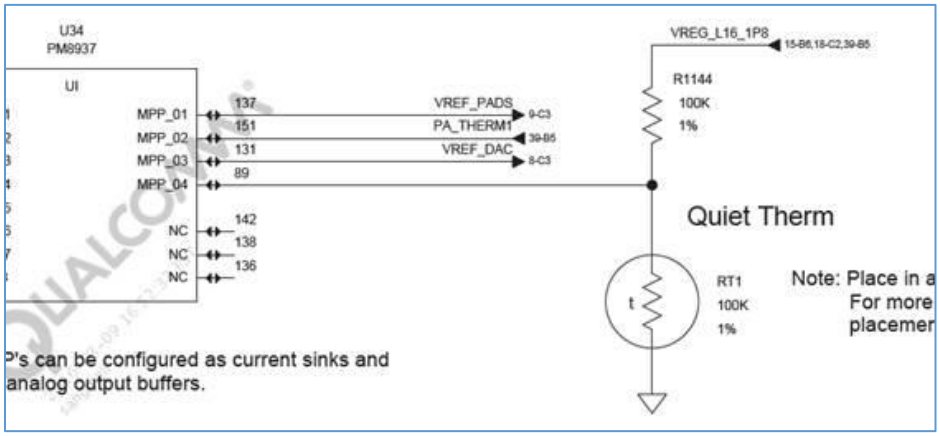
This is about how to add thermistor in PM chipset for thermal tuning step by step.

If you need another thermistor for different position thermal monitor, like: MSM, Camera and board temperature, hope it would help. Firstly, HW would select NTC Resistor from PVL list and connect it with PM GPIO pin.

Issue Analysis:

[Old chipsets]---Connected to MPSS_0X; PMIC Voltage ADC driver: qpnp-adc-voltage.c

MSM8937/MSM8952/MSM8976….




```
pm8937_mpps: mpps {
        compatible = "qcom,qpnp-pin";
……
        mpp@a300 {
```

```
                    /* MPP4 - CASE_THERM config */
                    reg = <0xa300 0x100>;  // => refer to PMXX register doc(-2X) to get the base address
                    qcom,pin-num = <4>;
                    qcom,mode = <4>; /* AIN input */  //=> choose MPSS function for ADC read.
                    qcom,invert = <1>; /* Enable MPP */
                    qcom,ain-route = <3>; /* AMUX 8 */
                    qcom,master-en = <1>;
                    qcom,src-sel = <0>; /* Function constant */
                };

        pm8937_vadc: vadc@3100 {
                compatible = "qcom,qpnp-vadc";
            ……..
                chan@13 {
                    label = "case_therm";
                    reg = <0x13>;   //channel ID, file PM89XX -1 SPEC file for ID, Decimal 16.
                    qcom,decimation = <0>;
                    qcom,pre-div-channel-scaling = <0>;
                    qcom,calibration-type = "ratiometric";
                    qcom,scale-function = <2>;
                    qcom,hw-settle-time = <2>;
                    qcom,fast-avg-setup = <0>;
                    qcom,vadc-thermal-node;
                };
```

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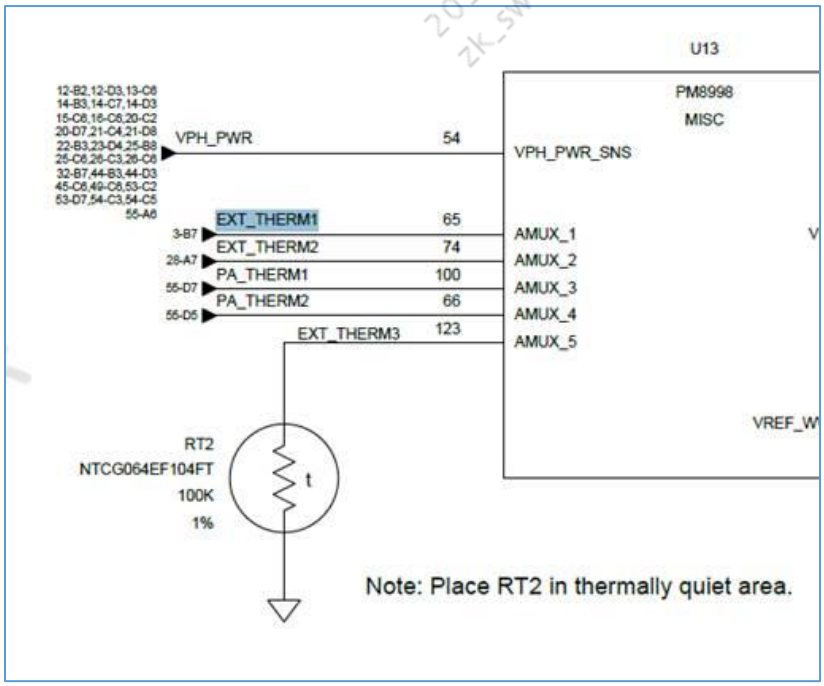
Table 3-15 AMUX input to ADC output enc

AMUX Ch #	Function	Typical input range		Auto scale
		Min (V)	Max (V)	
5	VCOIN pin	2	3.25	1/3
7	VPH_PWR pin	2.5	4.5	1/3
8	Die-temp monitor	0.4	0.9	1
9	0.625 V reference	0.625	0.625	1
10	1.25 V reference	1.25	1.25	1
12	Buffered 0.625 ref	0.625	0.625	1
14, 15	ADC GND and VDD	Direct connections to ADC		
16–19	MPP_01–MPP_04	0.1	1.7	1
32–35	MPP_01–MPP_04	0.3	5.1	1/3

Doc qpnp-adc-voltage.txt could give you a glimpse of detailed properities.

[New chipsets]---Connected to AMUX_X; and thermal zone registeration move to qpnp-adc-tm.c

MSM8998/SDM660….



&pm8998_vadc {

……

```
        chan@51 {
                label = "quiet_therm";
                reg = <0x51>;  ///channel ID, file PM89XX -1 SPEC file for ID
                qcom,decimation = <2>;
                qcom,pre-div-channel-scaling = <0>;
                qcom,calibration-type = "ratiometric";
                qcom,scale-function = <2>;
                qcom,hw-settle-time = <2>;
                qcom,fast-avg-setup = <0>;
        };
```

```
&pm8998_adc_tm {
……
        chan@51 {
                label = "quiet_therm";
                reg = <0x51>;  //channel ID, file PM89XX -1 SPEC file for ID
                qcom,pre-div-channel-scaling = <0>;
                qcom,calibration-type = "ratiometric";
                qcom,scale-function = <2>;
                qcom,hw-settle-time = <2>;
                qcom,btm-channel-number = <0x70>;
                qcom,thermal-node;
        };
```

4C	76	XO_THERM	Pin: XO_THERM	1/1	100 k	0 to 1.875
4D	77	AMUX_THM1	Pin: AMUX_1	1/1	100 k	0 to 1.875
4E	78	AMUX_THM2	Pin: AMUX_2	1/1	100 k	0 to 1.875
4F	79	AMUX_THM3	Pin: AMUX_3	1/1	100 k	0 to 1.875
50	80	AMUX_THM4	Pin: AMUX_4	1/1	100 k	0 to 1.875
51	81	AMUX_THM5	Pin: AMUX_5	1/1	100 k	0 to 1.875

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qcom,thermal-node/ qcom,vadc-thermal-node:

If present a thermal node is created and the channel is registered as part of the thermal sysfs which allows clients to use the thermal framework to set temperature thresholds and receive notification when the temperature crosses a set threshold, read temperature and enable/set trip types supported by the thermal framework.

sensor information:

it is a node that holds information about thermal sensors on a target. The information includes sensor type, sensor name, sensor alias and sensor scaling factor. The parent node name is qcom,sensor-information. It has a list of optional child nodes, each representing a sensor. The child node is named as qcom,sensor-information-<id>. The id takes values sequentially from 0 to N-1 where N is the number of sensors. This id doesn't relate to zone id or sensor id. msm_thermal.txt provide some example and more about qualcomm thermal driver.

```
qcom,sensor-information {
        compatible = "qcom,sensor-information";
        ……..
        sensor_information27: qcom,sensor-information-27 {
                qcom,sensor-type =  "adc";
                qcom,sensor-name = "quiet_therm";
        };
```

Moreover:

1. always, you could find a existing external thermistor from codebase, and duplicate in the way.
2. For more adc parameters, please find qpnp adc txt file to know it, customer could file case for PMIC HK-ADC team.
3. Via “adb shell cat /sys/class/thermal/thermal_zone*/type(temp)” to check whether added ADC channel output is correct.

Thx.