



Thermal binning

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Thermal binning

Problem statement

Same SoC - different packaging technology

- SKUs for different markets
- Differences in Thermal interface material
 - TIM1: Material between silicon die and package lid (inside package)
 - TIM2: Material between top of package and heatsink (system side)
- Differences in Thermal conductivity (W/mK)
 - Higher-K gives better conductivity
- Different junction temperature (T_j)

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 - TIM1: Material between silicon die and package lid (inside package)
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 - Higher-K gives better conductivity
- Different junction temperature (Tj)

Proposal

- Fuse mask as **thermal-bin** DT property
 - similar to **opp-supported-hw** for cpu frequency

```
qfprom@<addr> {  
    thermal_bin: thermal-bin@<addr> {  
        reg = <0xfoobar 0x2>;  
        bits = <5 6>;  
    };  
};
```

thermal-bin proposals

```
/thermal
```

```
    nvmem-cells = <&thermal_bin>;  
    nvmem-cell-names = "thermal_bin";
```

```
/gpu-0-thermal
```

```
    /trips
```

```
        /trip0
```

```
            temperature = <95000>;
```

```
            . . .
```

```
            thermal-bin = <0x1>;
```

```
        /trip1
```

```
            temperature = <110000>;
```

```
            thermal-bin = <0x2>;
```

```
    /maps
```

```
        /map0
```

```
            trip = <&trip0>;
```

```
        /map1
```

```
            trip = <&trip1>;
```

thermal-bin proposals

```
/thermal
```

```
    nvmem-cells = <&thermal_bin>;  
    nvmem-cell-names = "thermal_bin";
```

```
/gpu-0-thermal
```

```
    /trips
```

```
        /trip0
```

```
            temperature = <95000>;
```

```
            . . .
```

```
            thermal-bin = <0x1>;
```

```
        /trip1
```

```
            temperature = <110000>;
```

```
            thermal-bin = <0x2>;
```

```
    /maps
```

```
        /map0
```

```
            trip = <&trip0>;
```

```
        /map1
```

```
            trip = <&trip1>;
```

```
thermal-bin = <0x1>;
```

```
/trips
```

```
    /trip0
```

```
        temperature = <95000> <110000>;
```

thermal-bin proposals

```
/thermal
    nvmem-cells = <&thermal_bin>;
    nvmem-cell-names = "thermal_bin";

/gpu-0-thermal
    /trips
        /trip0
            temperature = <95000>;
            . . .
            thermal-bin = <0x1>;
        /trip1
            temperature = <110000>;
            thermal-bin = <0x2>;
    /maps
        /map0
            trip = <&trip0>;
        /map1
            trip = <&trip1>;
```

```
thermal-bin = <0x1>;
/trips
    /trip0
        temperature = <95000> <110000>;

/maps
    /map0
        trip = <&trip0>;
        cooling-device = <&gpu -1 -1>
        thermal-bin = <0x1>;
    /map1
        trip = <&trip1>;
        thermal-bin = <0x2>;
```

Thank you

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