SunnyIngTom-Patent Proposal

Crystal-oscillators with AT-cut-crystal in fundamental-mode have the following frequency-over-temperature-characteristic:

$$\frac{\Delta f_1}{f_1} = a_1(T - T_0) + b_1(T - T_0)^2 + c_1(T - T_0)^3$$

Crystal-oscillators that use the crystal on the n-th overtone show a similar behaviour:

$$\frac{\Delta f_n}{f_n} = a_n(T - T_0) + b_n(T - T_0)^2 + c_n(T - T_0)^3$$

The n-th overtone-frequency is not exactly the n-th multiplier of the fundamental frequency.

$$n * f_1 - f_n \approx k_1 + k_2 * f_0 * T$$

From this equation the temperature of the crystal can be calculated.
The result can be used to tune the crystal close to a temperature-independend frequency.
The crystal works as its own temperature-sensor.
This requires, that the crystal oscillates in fundamental-mode as well as in the n-th-overtone at the same time.

Proposal for a possible practical realisation: