Application Note

AS62x0 - Thermal Design Guidline

for Wearable Devices

Content Guide

1 General Description

The AS62x0 Product Family is a digital temperature sensor family for applications that require small form factors, ultra low power consumption and high accuracy.

Apart from numerous other applications, wearables are a perfect fit for this sensor. Especially for wearable devices, designing a housing for a good skin and environmental temperature measurement could be challenging.

In this document some design guidelines are listed to support you in your product design.

2 Sensing Skin Temperature

To measure a proband's skin temperature with the AS62x0 temperature sensor, it is mandatory to have a good thermal connection between the sensor and the skin. This can be archieved by placing a conductive pin in the housing of the device. The pin consists of a thermal conductive material like metal. In case of a metal housing, the pin should be isolated from the housing to reduce the thermal capacity of the temperature sensing.

The AS62x0 temperature sensor is thermally connected to the pin with thermal adhesive or thermal paste and electrically with a flex PCB as shown in ***Figure 1 Flex mounted sensor.***

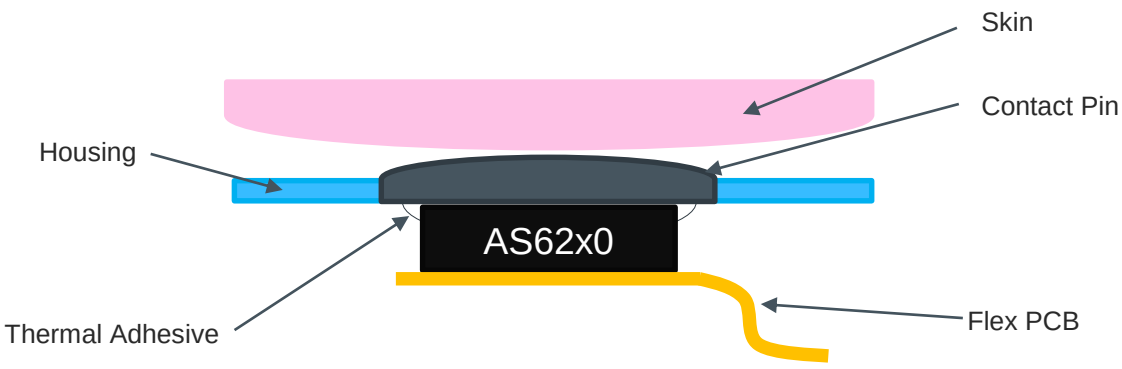

Figure 1 Flex mounted sensor

This design has the advantage that it enables a higher degree of freedom for placing the sensor where it is convenient for the product design, but could increase the costs due to the more expensive flex PCB.

In case it is preffered to have the sensor mounted on the mainboard, it is possible to use a contact spring to establishe a thermal connection. In this case the sensors exposed pad (or GND pad) and the contact spring have to either be connected with a circuit path (top side mounted) or a thermal via (buttom side mounted) as shown in ***Figure 2 PCB mounted sensor***.

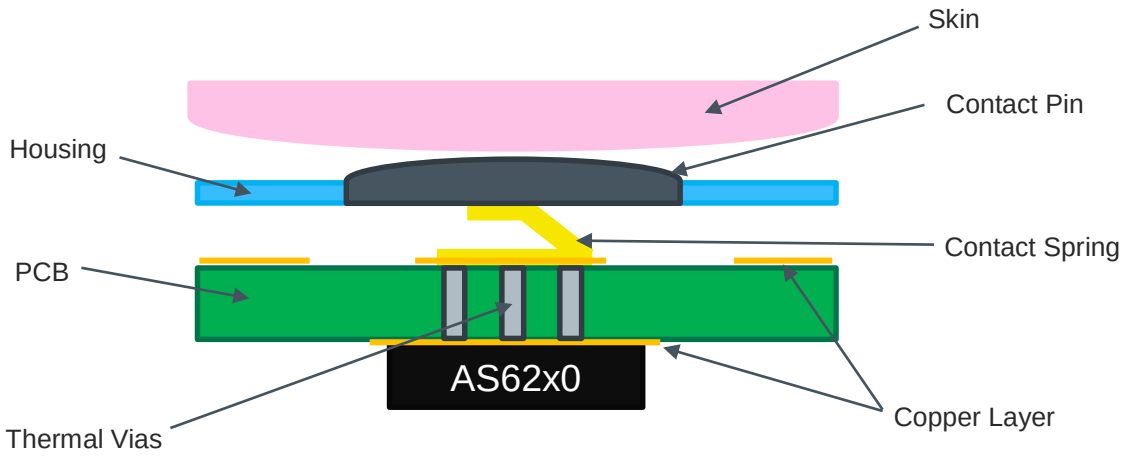

Figure 2 PCB mounted sensor

2.1 Temperature Response Time

To further improve the response time of the sensor, it is recommended to reduce the thermal capacity of the PCB. One important measure is to keep the area around the sensor free of any copper planes. In addition to that, a cutout as can be seen in ***Figure 3 PCB cutout*** should be applied.

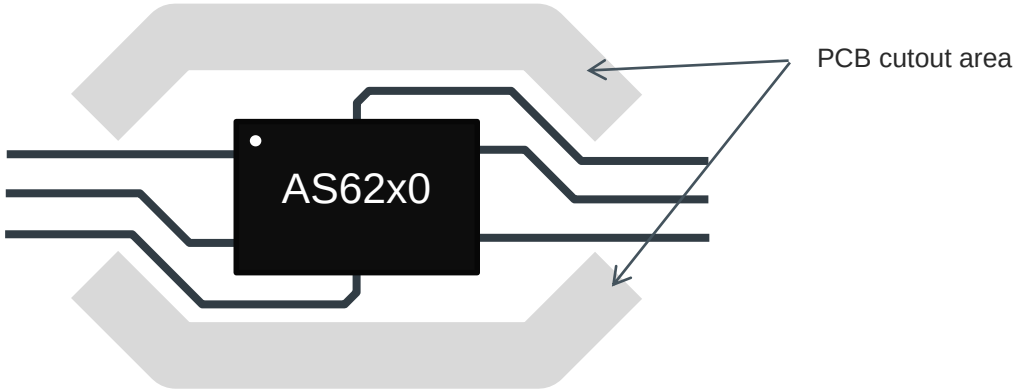

Figure 3 PCB cutout

3 Sensing Environmental Temperature

Sensing the environmental temperature is more challenging, as the housing is strongly influenced by the skin temperature of the proband. To avoide this, it is recommended to use two sensors. One sensing the skin temperature and the other to sense the environmental temperature. Developing a thermal modell of the device and a temperature prediction algorithm provides the best results in determining this parsameter.

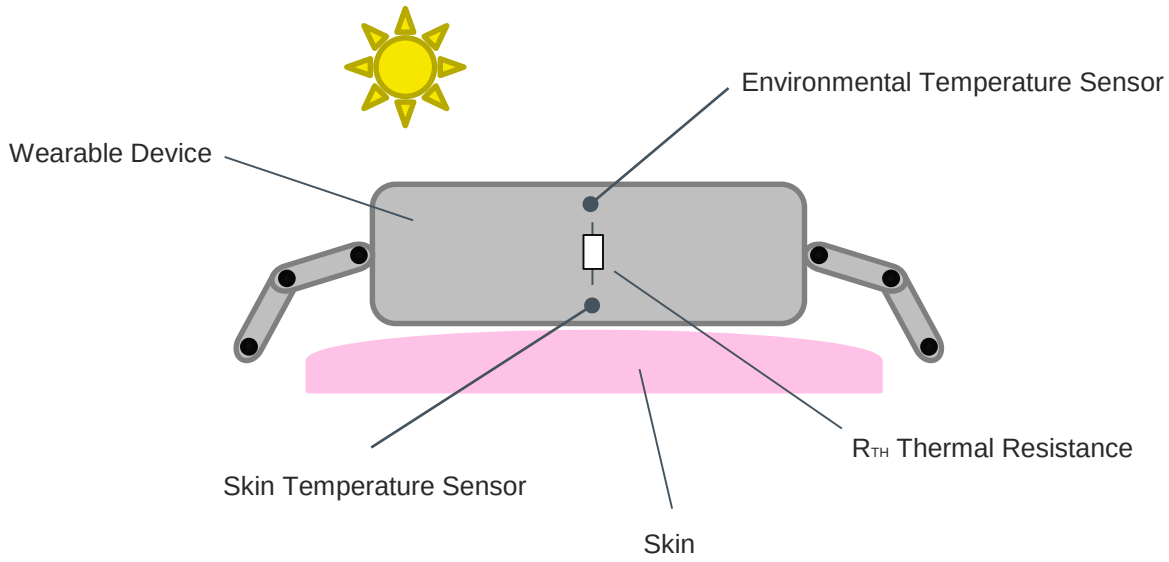

Figure 4 Environmental Sensing

The higher the thermal resistance between the environmental sensor and the skin sensor is, the more precise results are possible. This can be achieved by using low thermal conductive materials for the housing of the wearable device and deploying a good isolation between the sensor and the housing.

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6 Revision Information

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Note: Page numbers for the previous version may differ from page numbers in the current revision.