24-bit ADC PCB Layout Guide

D/N: AN0585EN

Introduction

Holtek has designed a variety of 24-bit ADC ICs with different ENOB (effective number of bits) accuracy levels to provide various high-precision sensor measurement functions, such as weight, pressure measurement, temperature and so on.

If the 24-bit ADC PCB layout is not implemented correctly, this may create incorrect measurement results. For example, if an improper capacitor is connected, the power supply may be unstable or if the signal routings are uneven, this may cause too much noise in the input signals to be measured.

This article will provides some 24-bit ADC PCB layout notes to assist designers to appropriately layout the PCB to obtain accurate measurement results.

PCB Layout Considerations

Power Supply

Both the digital power supply, VDD, and the analog power supply, AVDD, should use a star form of routing. The general routing method is to connect the digital power supply to the digital circuits and then directly connect it to the analog circuit as the analog power supply. However, if there is noise, the noise interference on the digital power supply will also be transmitted onto the analog circuits which will result in poor measurement results of the analog circuit. If a star form of routing is used, the analog and digital power traces are separate and independent and the noise interference from the digital power supply will have less effect on the analog circuits. Using star routing can prevent the analog measurements from being affected by the digital circuit.
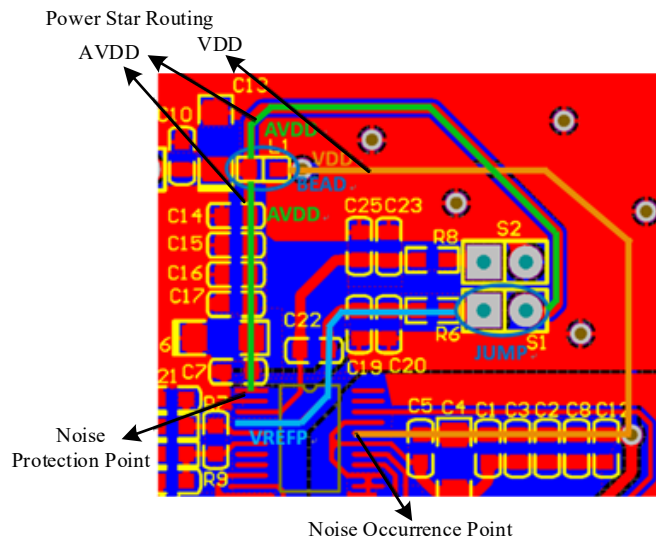
Figure 1

The routing method described above for the power supply routing, that is to use a star form of routing, should also be applied to the ground lines, namely VSS and AVSS, which should be separately connected to the ground.
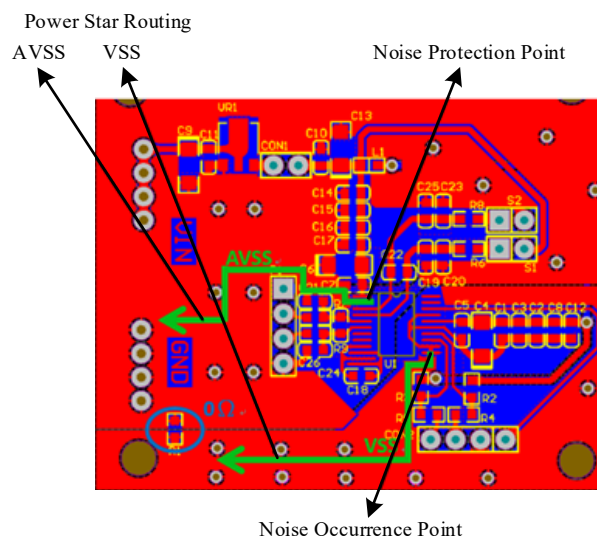

Figure 2

Signal Input

The ADC differential input terminals are named AN+ and AN-. Here the external components such as R, L, C and other components connected with the two input terminals should be exactly the same, the length and width of their traces should also be symmetrical and the same. This will ensure that the differential input terminal impedances will be symmetrical and consistent to obtain better measurement results.

The ADC differential input terminals are named AN+ and AN-, the length and width of their traces should also be symmetrical and the same.
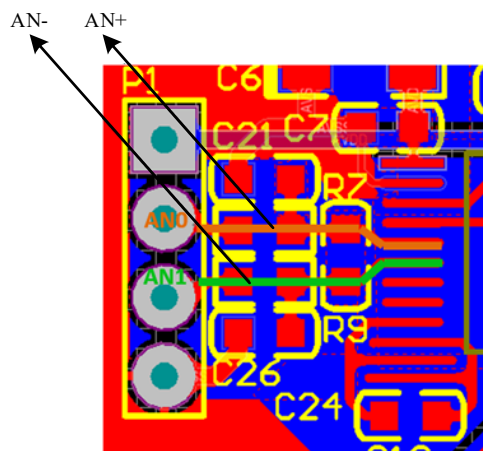

Figure 3

General considerations

1. If the analog input channel requires external components such as R or C, then these components should be connected as close as possible to the input pins to reduce external noise interference.

2. The analog and digital signals are isolated by VSS, their layouts also need to be separated and independent to avoid mutual interference.

3. The power trace should be as thick as possible to avoid unnecessary trace parasitic impedance.

4. The ground should be covered completely and its area should be as wide as possible, the VSS groups of each section should be connected to the ground, so that external noise interference can be reduced.

Conclusion

This article has provided some PCB layout guide when using the HT8 24-bit ADC IC. The above notes should be observed during PCB layout to obtain correct measurement results.

Reference Material

For more information consult the Holtek website www.holtek.com.

Versions and Modify Information

Date	Author	Issue
2020.7.3	蔡佳陽 (Chia, Tsai)	V1.00

Disclaimer

All information, trademarks, logos, graphics, videos, audio clips, links and other items appearing on this website ('Information') are for reference only and is subject to change at any time without prior notice and at the discretion of Holtek Semiconductor Inc. and its related companies (hereinafter 'Holtek', 'the company', 'us', 'we' or 'our'). Whilst Holtek endeavors to ensure the accuracy of the Information on this website, no express or implied warranty is given by Holtek to the accuracy of the Information. Holtek shall bear no responsibility for any incorrectness or leakage.

Holtek shall not be liable for any damages (including but not limited to computer virus, system problems or data loss) whatsoever arising in using or in connection with the use of this website by any party. There may be links in this area, which allow you to visit the websites of other companies. These websites are not controlled by Holtek. Holtek will bear no responsibility and no guarantee to whatsoever Information displayed at such sites. Hyperlinks to other websites are at your own risk.

Limitation of Liability

In no event shall Holtek Limited be liable to any other party for any loss or damage whatsoever or howsoever caused directly or indirectly in connection with your access to or use of this website, the content thereon or any goods, materials or services.

Governing Law

This disclaimer is subjected to the laws of the Republic of China and under the jurisdiction of the Court of the Republic of China.

Update of Disclaimer

Holtek reserves the right to update the Disclaimer at any time with or without prior notice, all changes are effective immediately upon posting to the website.