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NVE Corporation
11409 Valley View Road
Eden Prairie, MN 55344-3617

Manual No.: SB-00-105

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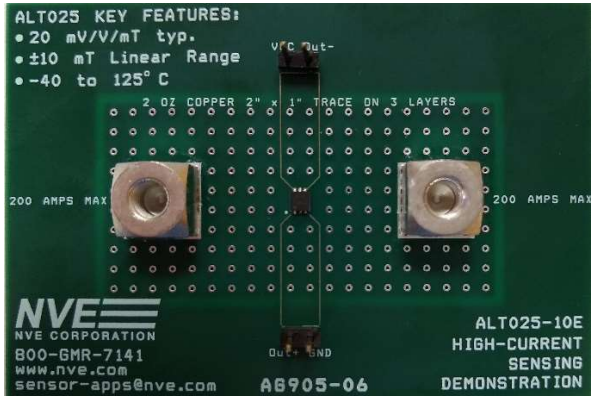
AG905-07
ALT025-10E High Current Demonstration



SB-00-105

NVE Corporation (800) 467-7141 sensor-apps@nve.com www.nve.com

Overview

This demonstration board showcases the remarkable linear range and accuracy of NVE's ALT025-10E TMR Magnetometer with up to ±200 amps noncontact current measurement. Key ALT025-10E features include:

- Bipolar Wheatstone bridge analog output
- High Sensitivity: 20 mV/V/mT typical
- Excellent linearity over wide range: 0.5% F.S. over 5 mT
- 20 kΩ bridge resistance/10 kΩ output impedance for easy interface
- Low hysteresis: 1% worst case
- Wide bandwidth: 300 kHz
- -50°C to 125°C
- Ultraminiature 2.5 mm x 2.5 mm TDFN6 package

Quick Start

- ⇨ Connect V_{cc} and GND to a power supply (5.5V max) or a battery.
- ⇨ Connect the sensor "Out+" and "Out-" to a meter.
- ⇨ Connect an AC or DC current via the screw terminals.
- ⇨ Compare the sensor output to the current.

High Current PCB

The AG905-06 is a four-Layer PCB designed for maximum current capability at low cost. Current flows through three two-oz. 2" x 1" traces on the bottom and inner layers, which minimizes the total resistance for low temperature rises. Thermal vias connect the three trace layers together to lower the resistance further and support cooling. The inner plane layers are electrically isolated from the trace and remove heat from the trace due to copper's high thermal conductivity.

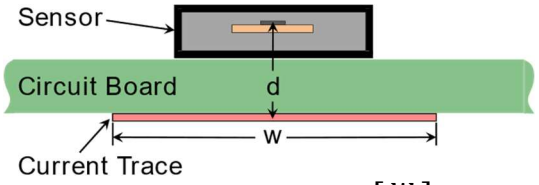
By running the sense current through 3 layers, trace heating is minimized, and heat easily spreads through the PCB to support cooling. This PCB measures 3" x 2.065" and reaches the FR4 glass transition temperature at around 230 amps.

A similar layout in a larger PCB will have a lower temperature rise due to improved cooling.

More information about high current PCB design can be found in our application note:
www.nve.com/Downloads/SB-00-083_Precision_High_Current_Sensing_Over_PCB_Traces.pdf

Principles of Operation

Current through the traces generate a magnetic field that is read by the sensor. The magnetic field can be predicted by the following formula:



$$H = \frac{0.4 \cdot I \cdot arctan\left[\frac{w}{2d}\right]}{w}$$

where the magnetic field H is in millitesla, the width of the trace *w* in mm, and *d* in mm. The AG905-06 produces 0.023 mT/amp at the sensor, which corresponds to ±220 amps in the sensor's highly linear ±5 mT range.

We have a free web-application to help with these calculations and more:
www.nve.com/spec/calculators.php#tabs-Current-Sensing

Check out other current sensing demonstrations and evaluation kits, available now:
https://www.nve.com/EvaluationKits.php