

Thermocouple board Technical Manual

Document Revision: 1.01

Date: 2 October, 2004



BiPOM Electronics, Inc.

16301 Blue Ridge Road, Missouri City, Texas 77489
Telephone: 1-713-283-9970 Fax: 1-281-416-2806
E-mail: info@bipom.com
Web: www.bipom.com

© 2004 by BiPOM Electronics. All rights reserved.

Thermocouple board. No part of this work may be reproduced in any manner without written permission of BiPOM Electronics.

All trademarked names in this manual are the property of respective owners.

WARRANTY:

BiPOM Electronics warrants Thermocouple board for period of 90 days. If the board becomes defective during this period, BiPOM will at its option, replaced or repair the board(s). This warranty is voided if the product is subjected to physical abuse or operated outside state electrical limits. BiPOM Electronics disclaims to any external devices connected to boards of Thermocouple board. BiPOM Electronics disclaims all warranties express or implied warranties of merchantability and fitness for a particular purpose. In no event shall BiPOM Electronics be liable for any indirect, special, incidental or consequential damages in connection with or arising from the use of this product. BiPOM Electronics' liability is limited to the purchase of this product.

TABLE OF CONTENTS

| | |
|-----------------------------|------------------------------|
| 1. INTRODUCTION | 3 |
| 2. OVERVIEW | |
| 3. SPECIFICATIONS | 4 |
| 4. FUNCTIONAL BLOCKS | ERROR! BOOKMARK NOT DEFINED. |
| 5. BOARD LAYOUT | 5 |
| 6. SCHEMATICS | 6 |

1. Introduction.

A thermocouple is a sensor for measuring temperature. It consists of two dissimilar metals, joined together at one end. When the junction of two metals is heated or cooled some voltage is produced that can be correlated back to the temperature. A thermocouple is available in different combinations of metals or calibrations. The four most common calibrations are J, K, T and E. There are high temperature calibrations R, S, C and GB. Each calibration has a different temperature range and environment.

Typically, when a thermocouple is connected to any equipment, two unwanted thermocouple junctions are formed where the iron and constantan connect to ordinary copper wire (see figure 1). These junctions are commonly called the cold junction because a common practice is to immerse the T2 junction in 0°C ice/water slurry to make T2 independent of room temperature variations. Thermocouple tables are based on a cold junction temperature of 0°C.

The BiPOM Thermocouple Board provides LT1025 Linear Technology IC which adds a temperature dependent voltage ($V_{comp.}=f(T)$) such that the voltage sum is the same as if T2 junctions were at a constant 0°C.

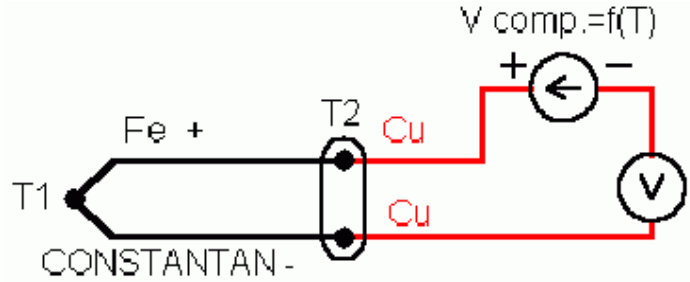


Figure 1.

2. Overview.

Thermocouple Board is intended to a wide range temperature measurement using various types of thermocouples. It has four independent channels. Each channel consists of LT1025 cold junction compensator IC and precision thermocouple voltage amplifier.

There are two ways to connect Thermocouple board to other BiPOM boards:

- Directly to MINI-MAX-51F single board computer board, through analog connector.
- To a DAQ-2543 Analog peripheral board, through analog connector. DAQ-2543 should be then connected to either of BiPOM single board computer, such as MINI-MAX/51-C, MINI-MAX/51-D, MINI-MAX/51-E, or MINI-MAX/PIC.

Up to two Thermocouple boards can be connected at the same time.

3. Specifications

- 26-pin analog connector compatible to MINI-MAX/51-F and DAQ2543 boards.
- 8-pole screw terminal for four thermocouple connection.
- Single +5V power supply comes through analog connector.
- Dimensions are 2.35 X 2.40 inches (5.97 X 6.10 centimeters).
- Mounting holes of 0.138 inches (3.5 millimeters) are on four corners.
- 0° - 70° C operating, -40° - +85° C storage temperature range.
- 2-layer PCB ,no vias for maximum reliability.

4. Functional blocks.

Thermocouple board has four similar channels. Block diagram of each channel is shown at Figure 2.

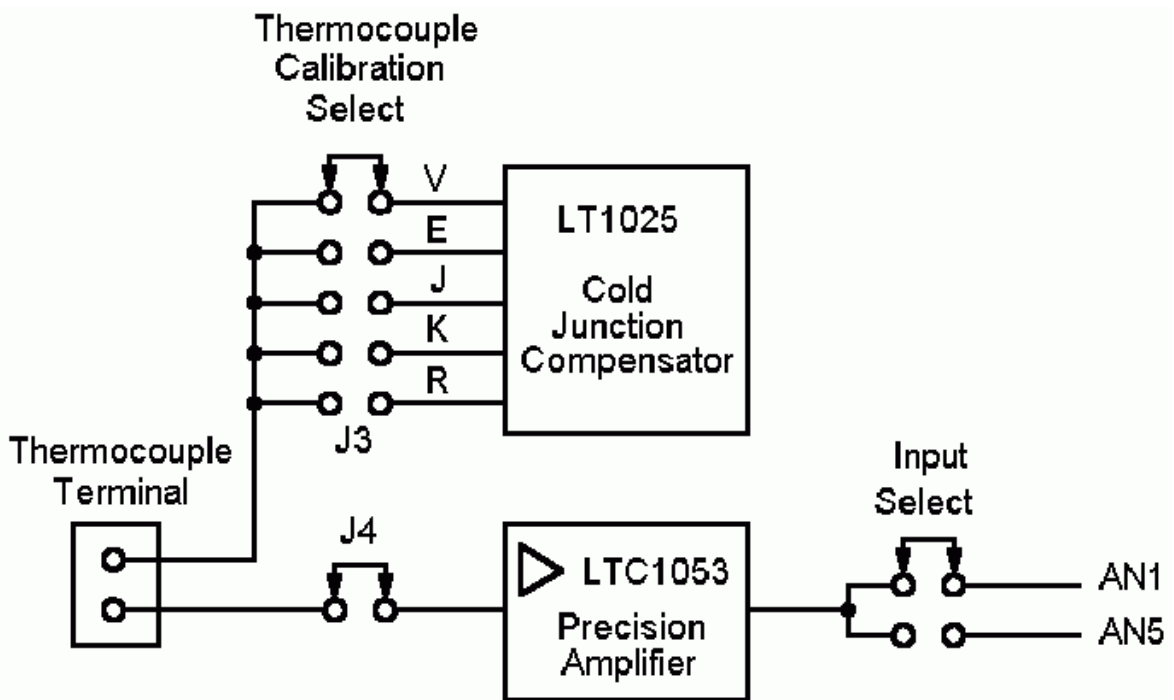


Figure 2.

Thermocouple calibration jumper should be set in accordance to thermocouple type used. J4 jumper is provided to compensate parasitic thermocouple of J3.

There are also J1 and J2 (Input select) jumpers. If J1 jumpers are installed, AN1 through AN4 analog inputs are used. If J2 jumpers are installed, used analog channels are AN5 through AN8. This feature allows to connect two thermocouple boards at the same time.

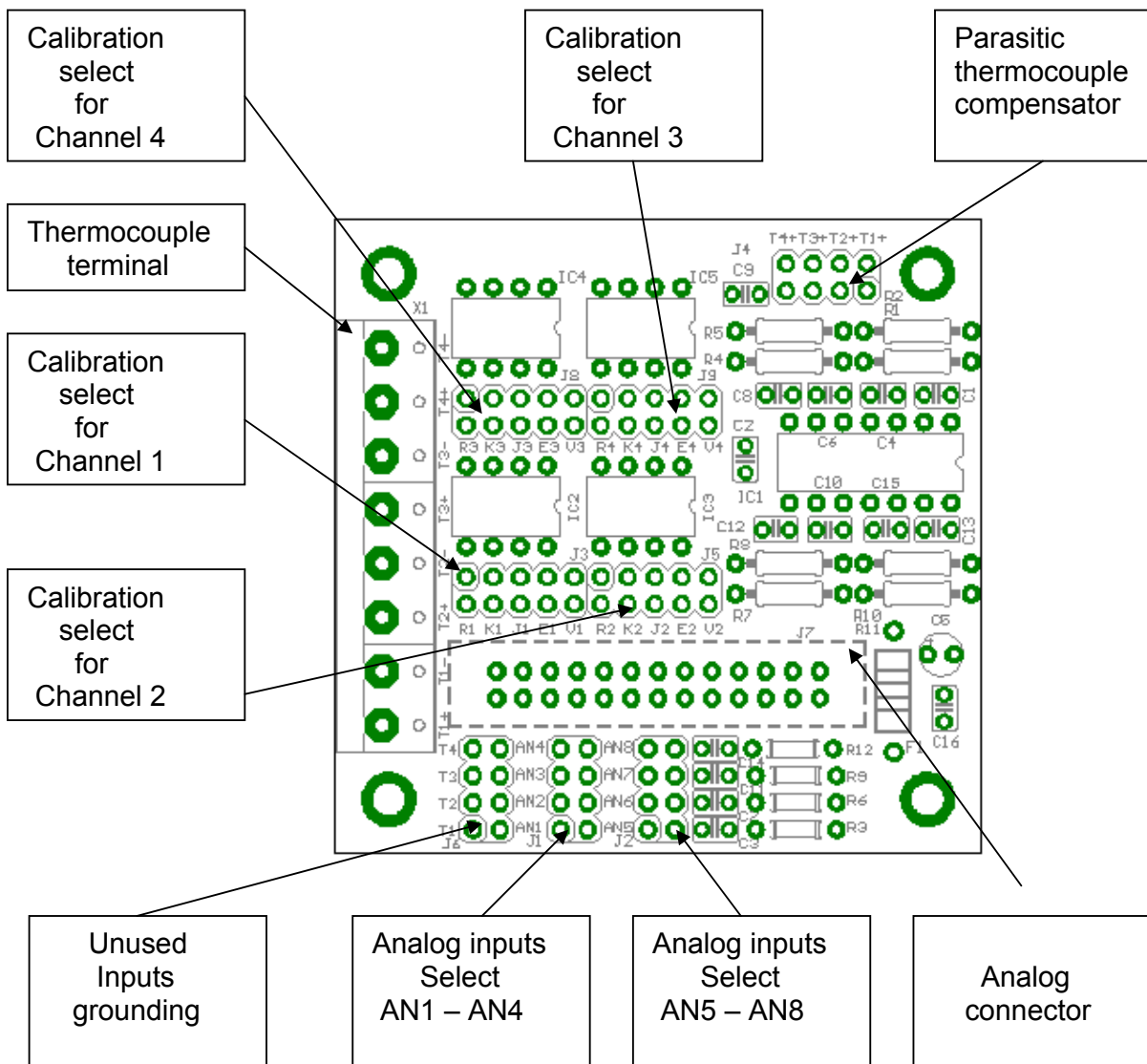
Unused channels amplifier inputs should be grounded with J6 jumpers. Amplifier gains of all channels equal 137.

Thermocouple amplifiers outputs are wired to connector J7. Single +5V power supply for thermocouple board comes through this connector too (see Table 1). Table 1 shows pin assignment of analog inputs and power sources of DAQ-2543 board.

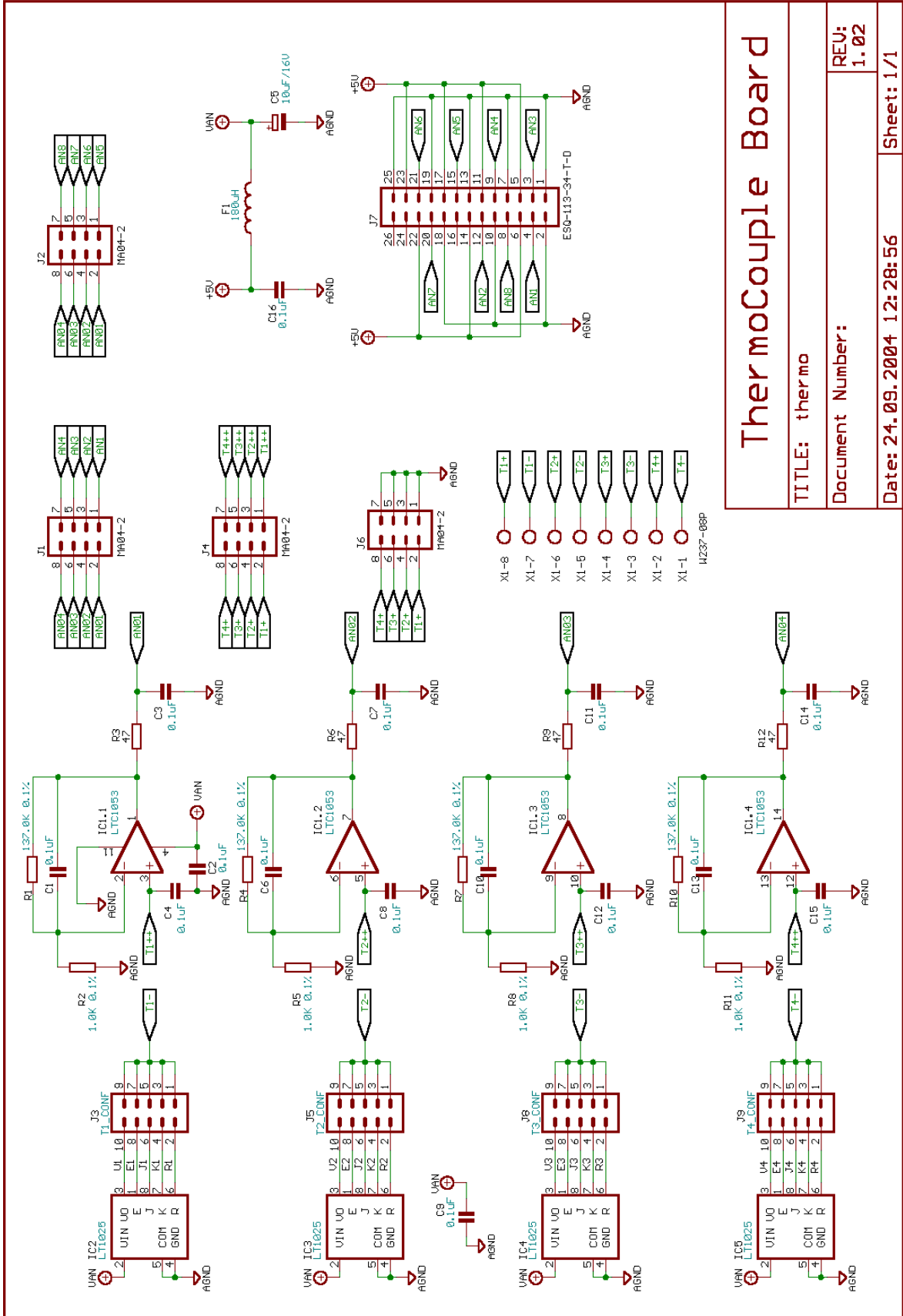
| Signal | Pin | Pin | Signal |
|--------|-----|-----|--------|
| AGND | 1 | 2 | AGND |
| AN3 | 3 | 4 | AN1 |
| +5V | 5 | 6 | +5V |
| AGND | 7 | 8 | AN0 |
| AN4 | 9 | 10 | AGND |
| +5V | 11 | 12 | AN2 |
| AGND | 13 | 14 | +5V |
| AIN5 | 15 | 16 | - |
| +5V | 17 | 18 | AGND |
| AGND | 19 | 20 | AIN7 |
| AIN6 | 21 | 22 | +5V |
| +5V | 23 | 24 | - |
| AGND | 25 | 26 | - |

Table 1.

4. Board layout.



5. Schematics.



| | |
|-----------------------------|------------|
| <h2>ThermoCouple Board</h2> | |
| TITLE: thermo | |
| Document Number: | |
| REU: 1.02 | Sheet: 1/1 |

Date: 24.09.2004 12:28:56