THERMOCOUPLE-1
Peripheral Board

Technical Manual

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WARRANTY:

BiPOM Electronics warrants THERMOCOUPLE-1 board for period of 1 year. 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-1 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.

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-1 Board provides LT1025 Linear Technology IC which adds a temperature dependent voltage (V comp.) such that the voltage sum is the same as if T2 junctions were at a constant 0°C.

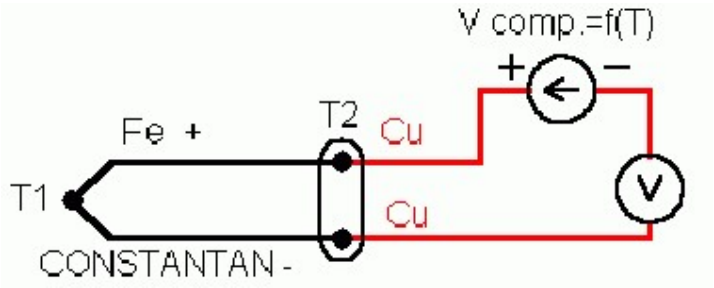


Figure 1

2. Overview

THERMOCOUPLE-1 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-1 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 8 THERMOCOUPLE-1 boards can be connected at the same time.

3. Specifications

- Uncalibrated Cold junction compensation error: 0.5 ºC
- Gain error: 0.2% of full scale
- 26-pin analog connector compatible with MINI-MAX/51-F and DAQ2543 boards.
- 2–pole screw terminal for 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 for maximum reliability.

4. Functional blocks

Block diagram of THERMOCOUPLE-1 board is shown at Figure 2.

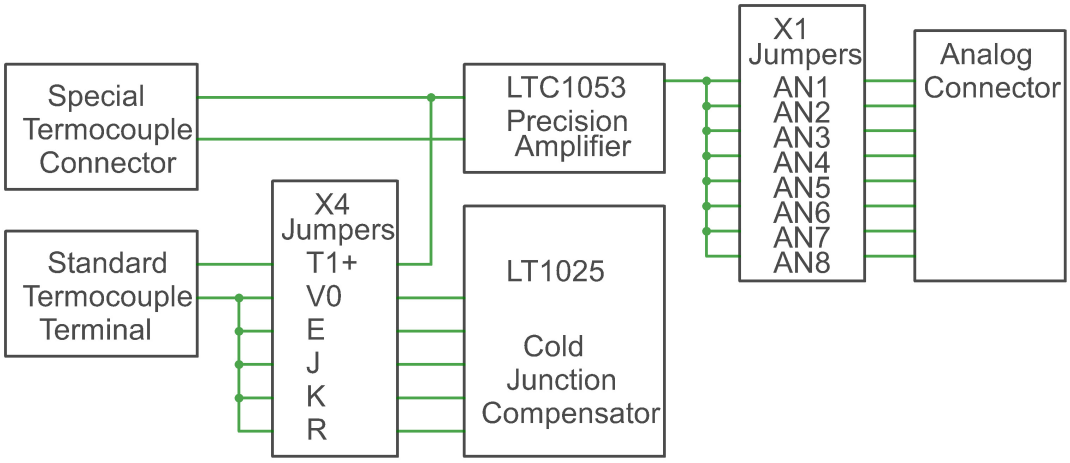


Figure 2

A thermocouple could be connected to the board either through standard terminal or special connector. If Standard terminal is used, thermocouple calibration jumper should be set in accordance to thermocouple type used in X4 jumper block. T1+ jumper should be installed in this case. Refer to figure 3. If Special thermocouple connector is used, T1+ jumper should be removed, and calibration jumpers do not affect anything.

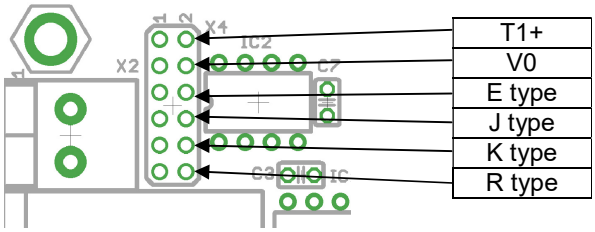


Figure 3

Using X1 (Input select) jumper block, depending on jumper position, AN1 through AN8 analog input could be used, as it shown on Figure 4. This feature allows connecting up to 8 THERMOCOUPLE-1 boards at the same time.

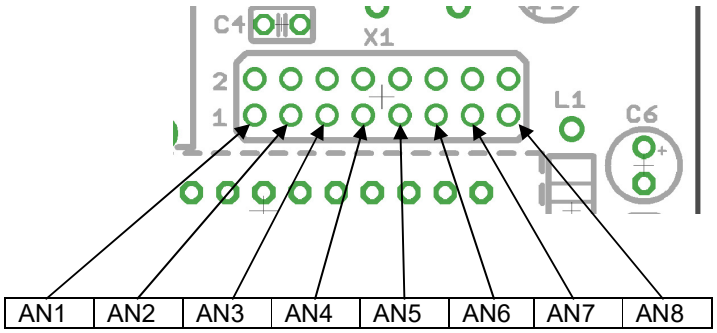


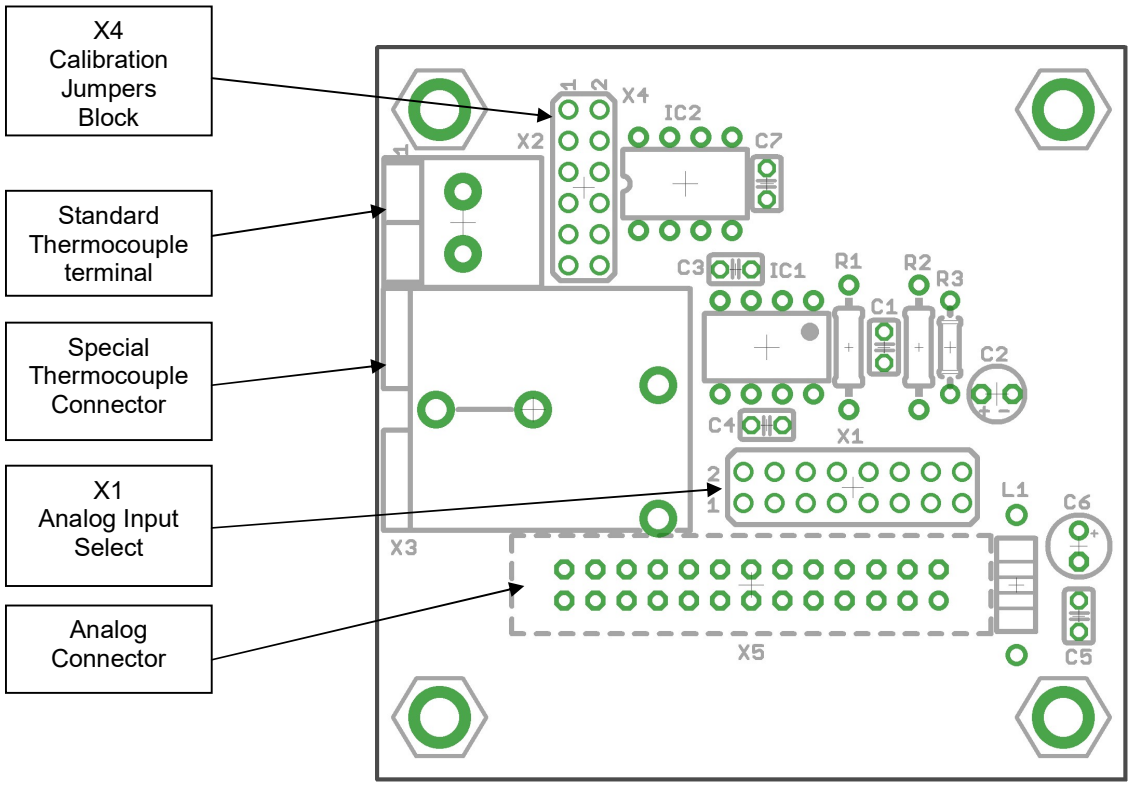
Figure 4

Thermocouple amplifier output can be wired to one of Analog Inputs of connector J7. Single +5V power supply for THERMOCOUPLE-1 board comes through this connector too (see Table 1). Table 1 shows the 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

5. Board layout



5. Schematics.