

Voltage signal measurement with Ib2 mode of UTI

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Figure 1 shows a simplified circuit diagram for the measurement of the voltage signal with using the Ib2 mode of the UTI.

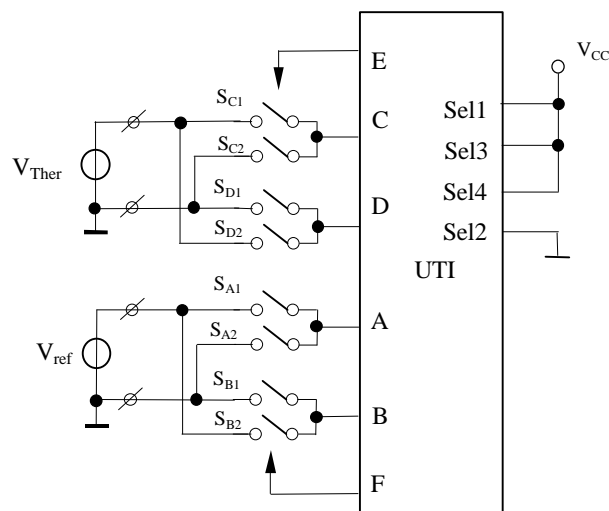


Figure 1 A simplified circuit diagram for the measurement of the voltage signal with using the Ib2 mode of the UTI.

In this Figure, V_{Ther} and V_{ref} denote the thermocouple signal and a voltage reference, respectively. The switches S_{C1} , S_{C2} , S_{D1} , S_{D2} , S_{A1} , S_{A2} , S_{B1} and S_{B2} form a chopping for the measured signals, V_{Ther} and V_{ref} . Where S_{C1} , S_{D1} , S_{A1} and S_{B1} are controlled by the signal from pin E. The switches S_{C2} , S_{D2} , S_{A2} and S_{B2} are controlled by the signal from pin F. The thermocouple voltage signal is obtained from:

$$V_{Ther} = \frac{T_{CD} - T_{off}}{T_{AB} - T_{off}} \cdot V_{ref} \quad (1)$$

The reference voltage should be between 100 mV and 200 mV. With this circuit, the signal V_{Ther} within a range of ± 200 mV can be measured accurately. The resolution and accuracy for the voltage signal measurement could be 13 bits and 11 bits, respectively.

The circuit shown in Figure 1 also can measure the signal V_{Ther} with a common mode DC voltage.

In order to reduce the effect of the lead wire and the switch ON resistor, the analog switch with low leakage current should be used.

Figure 2 shows a circuit diagram with practical components. In this example, a thermocouple with ground is measured.

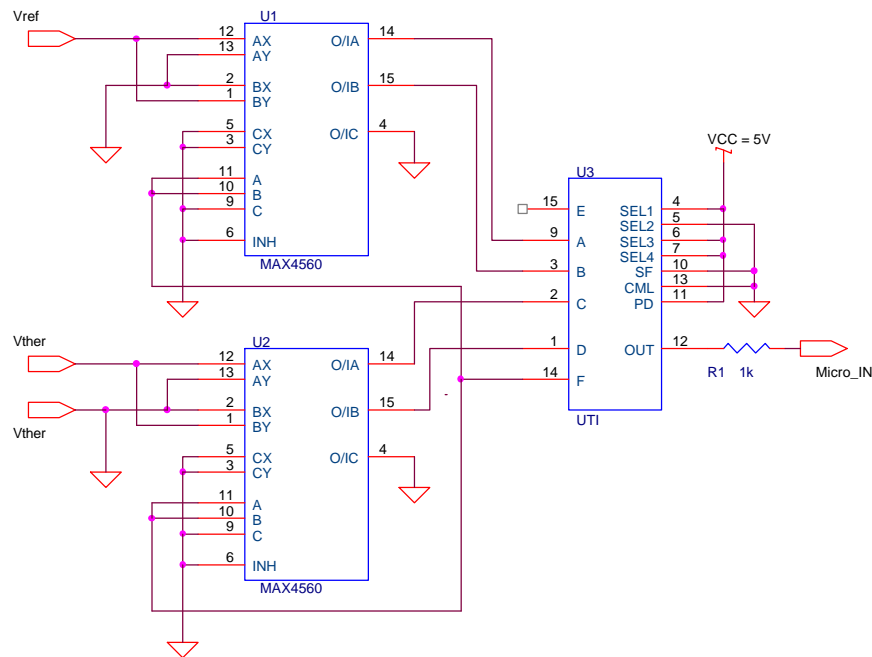


Figure 2 A Circuit diagram with practical components.

Components:

- | | | | |
|---|---|-------------|------------------------------|
| 1 | 2 | Max4560 | MAXIM Multiplexer (or other) |
| 2 | 1 | UTI03 | Smartec UTI |
| 3 | | Voltage ref | 100 – 200 mV ref, |

As shown in (1) V_{ref} must have a good long term stability due to the fact V_{ther} is given as a fraction of V_{ref} . This low V_{ref} can easily be made by a normal bandgap reference and a resistor divider.

Normal precautions have to be taken to the connection of the thermocouple to the multiplexer.