

Application and Circuit Description

I am using the ADT7470 (Fan controller/Temperature hub) with five TMP05s in a daisy chain configuration. It is used in a 250W paging transmitter application (148MHz VHF band) to monitor the temperatures of the baseband board, power amplifier (PA), driver and the RF isolator. The maximum temperature the system is expected to reach is 80°C. The function of each sensor is detailed below.

Baseband Temperature Sensor – U2.

Location – Digital baseband board which also contains the ADT7470 and the microprocessor (NXP LPC2468) that controls it.

The function of this sensor is to monitor the ambient temperature.

PA Temperature Sensor – U3.

Location – PA/Driver board.

The function of this sensor is to monitor the PA temperature.

Driver Temperature Sensor – U4.

Location – PA/Driver board.

The function of this sensor is to monitor the Driver temperature.

PA/Driver Ambient Temperature Sensor – U5.

Location – PA/Driver board.

The function of this sensor is to monitor the ambient temperature of the PA/Driver board.

Isolator Ambient Temperature Sensor – U6.

Location – Isolator board.

The function of this sensor is to monitor the temperature of the RF isolator.

There are three boards and the signals of interest are connected between these boards through shielded flat ribbon cables (100Ω) as shown in the attached figures. For filtering of RF signals and also to maintain the continuity of the impedance a RC feed through capacitor NFR21GD1011012L from Murata (R = 100Ω, C = 100pF) was used as shown in the circuit diagram.

The ADT7470 in addition to controlling the five TMP05s it also controls two 12V fans. The fans are three wire fans with a tachometer output and ADT7470 uses PWM to control them. There are no problems with the fan control section.

Problem Description

We have observed that during testing the sensed temperature suddenly have large jumps up to 100°C and then return back to the normal expected temperature. It happens to all sensors but does not happen simultaneously. Furthermore they experience the problem irrespective of whether the transmitter is on (250W RF output at 148MHz) or off. Hence we believe it not to be an RF interference issue and also we have taken steps to have the IN and OUT signals to and from TMP05 sandwiched between guard trances in the high power RF/Driver board. The integrity of the 3.3V LVCMOS is good. At the moment we have implemented a software filter if the temperature jump is more than 10°C from any of the five sensors then that measurement is discarded and a counter, Bad Reads, is incremented. Over several months of testing the counter has reached several thousand indicating the problem is present. I would like to know the cause of this issue and your advice is appreciated.

I have attached the block diagram of the configuration and the circuit diagram for your reference. Note the circuit diagram for the daisy chain is shown as a single schematic although it is physically in three separate circuit boards.

Thanks

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