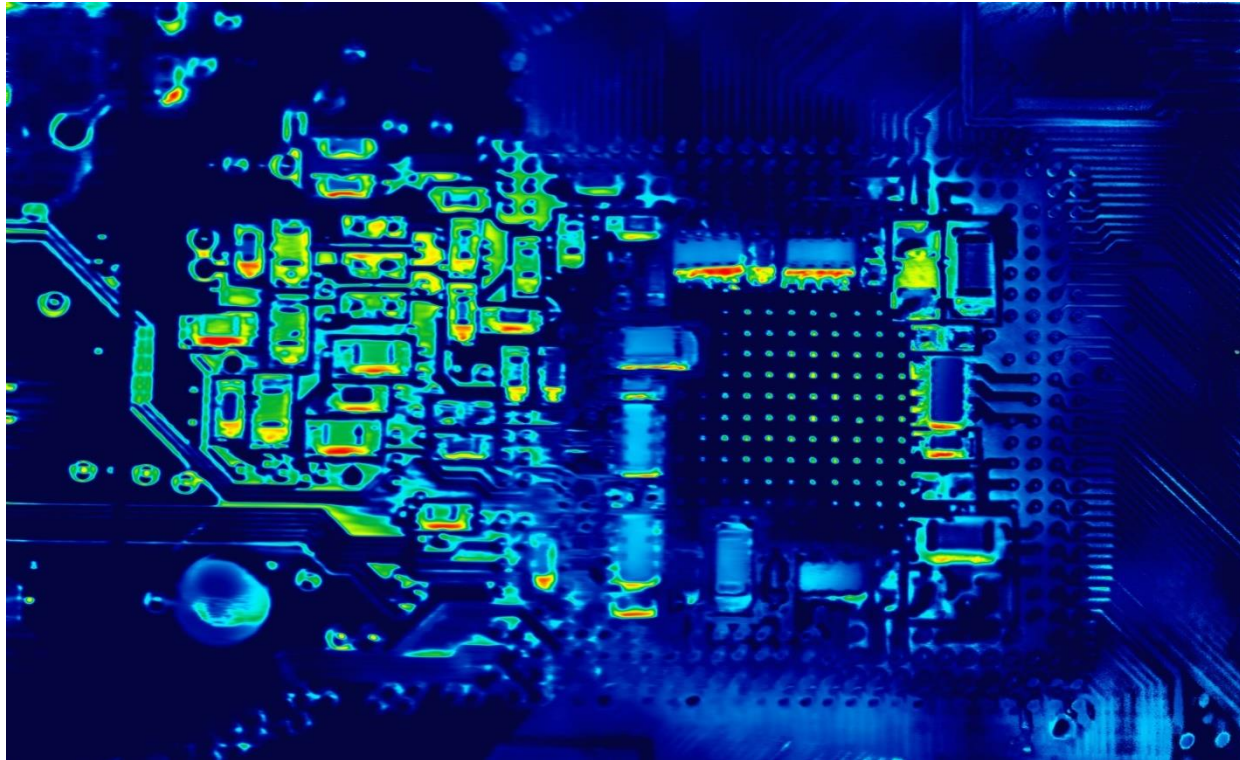


Thermal Protection with Silicon Based Temperature Sensors

TI Precision Labs – Temperature Sensors

Presented and prepared by Jalen Tate

What is Thermal Damage?



Example of thermal stress
on printed circuit board (PCB)

Affects:

- Integrated circuits
- Device packages
- Solder joints
- PCB material properties

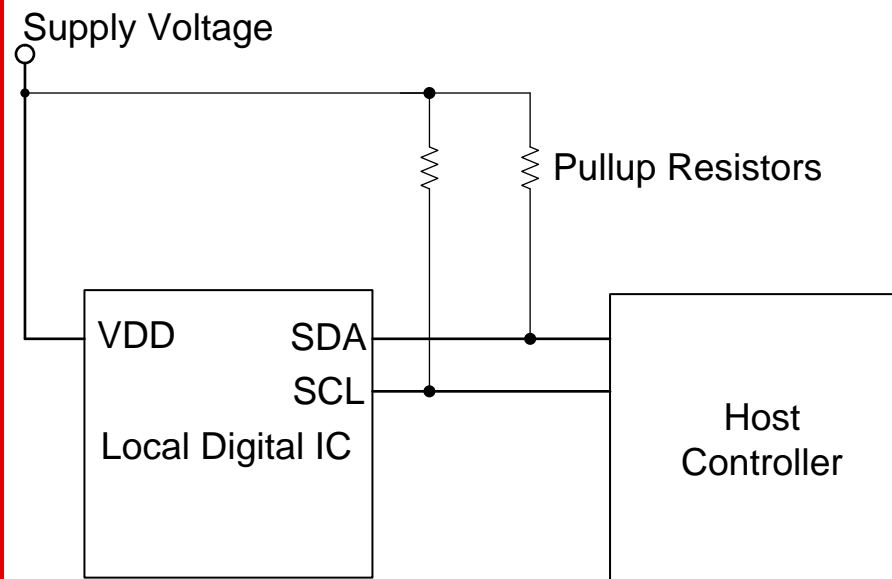
When prevented:

- Components and PCB protected
- Higher efficiency and performance
- Better reliability
- Higher safety

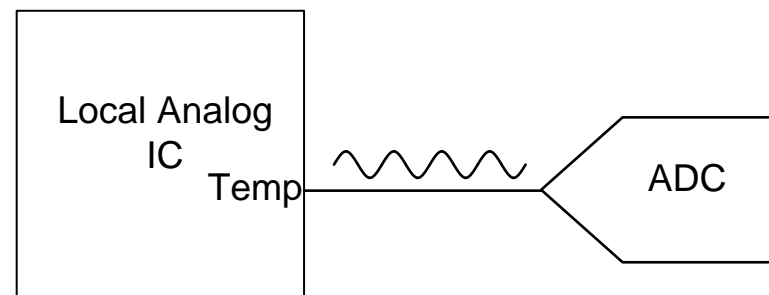
Note: Understanding effects of temperature on control systems can help system designers anticipate and prevent thermal damage

Detection and Monitoring Methods

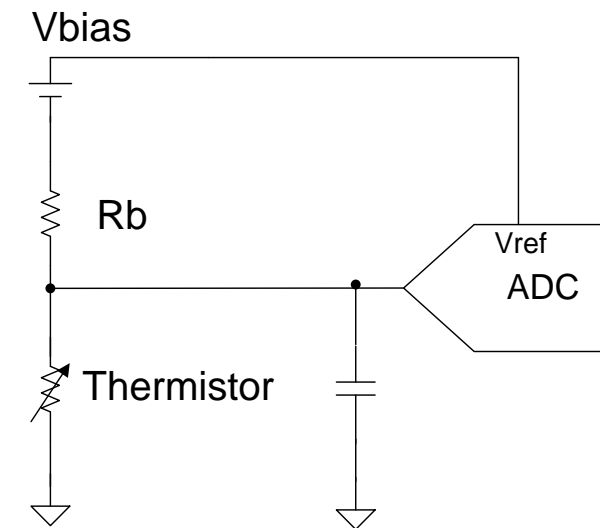
Digital Local Temperature Sensor



Analog Local Temperature Sensor

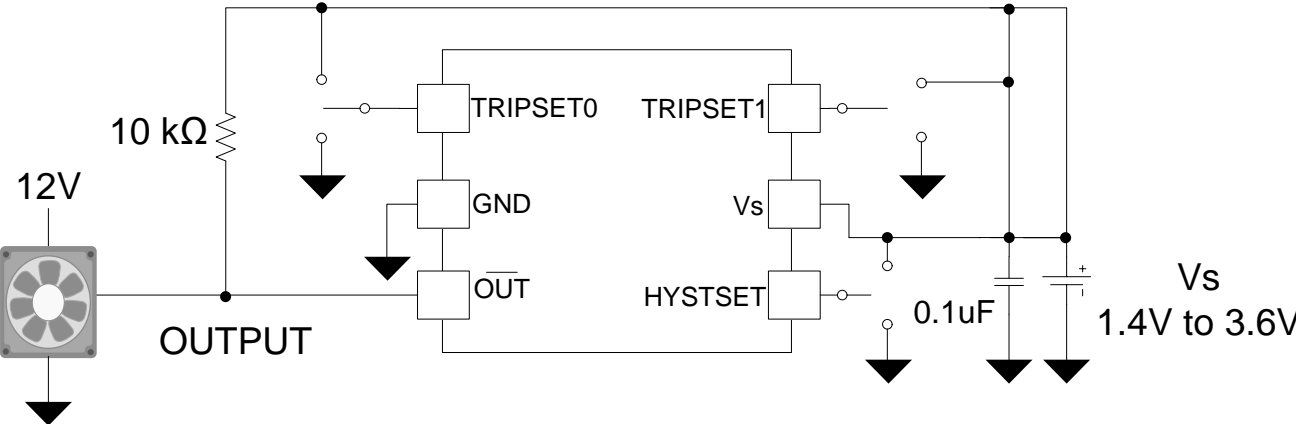


Thermistor

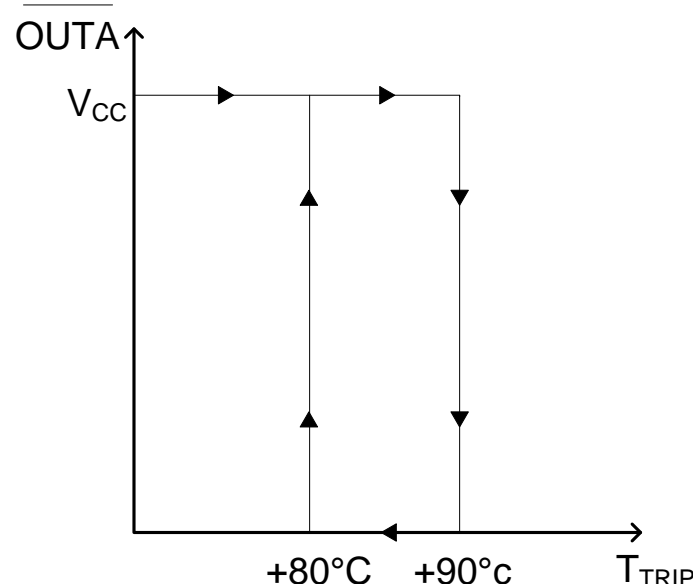


Protection/Prevention Methods

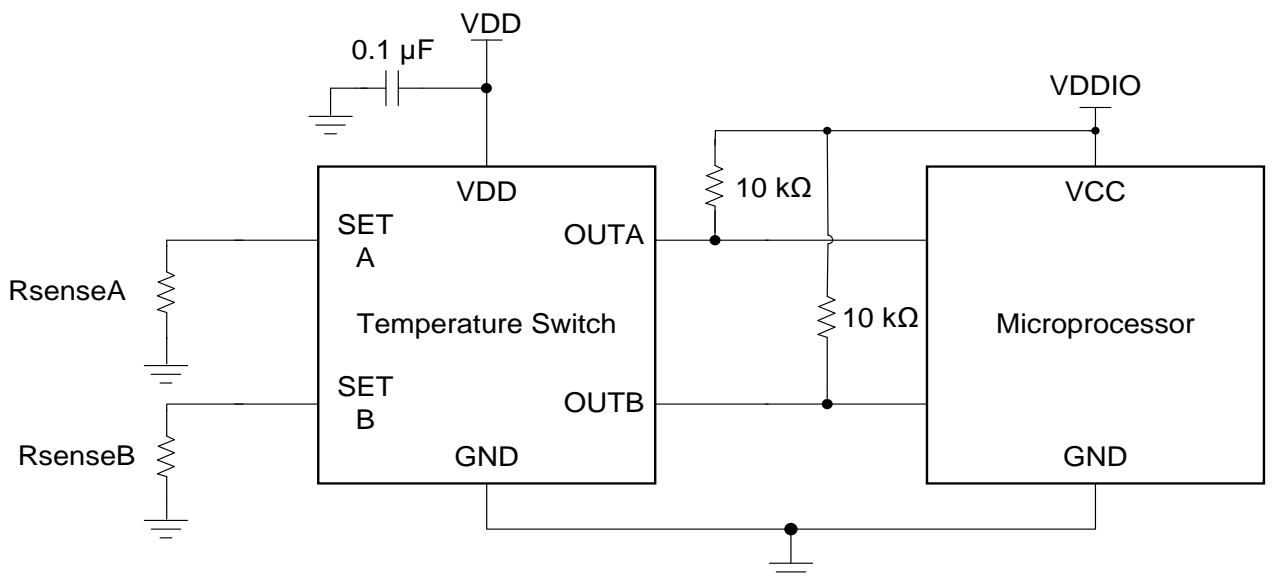
Pin Programmable Temperature Switch



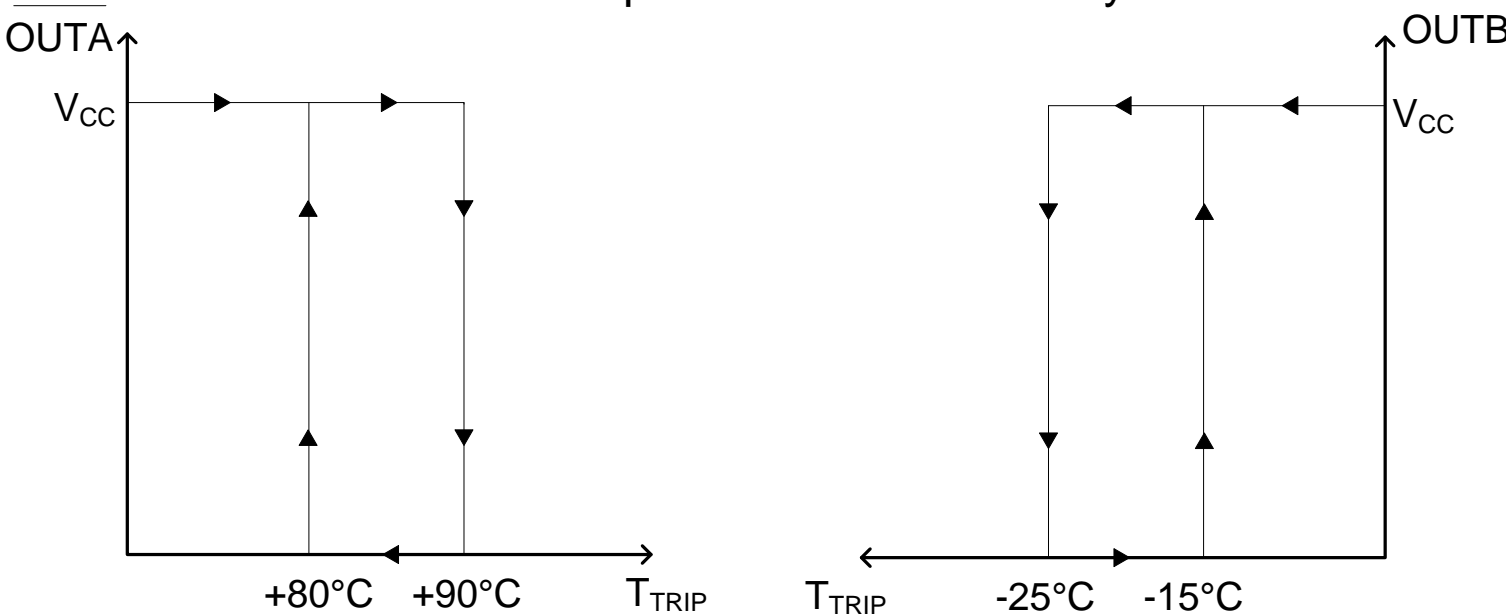
One Channel Temperature Switch with Hysteresis



Resistor Programmable Temperature Switch

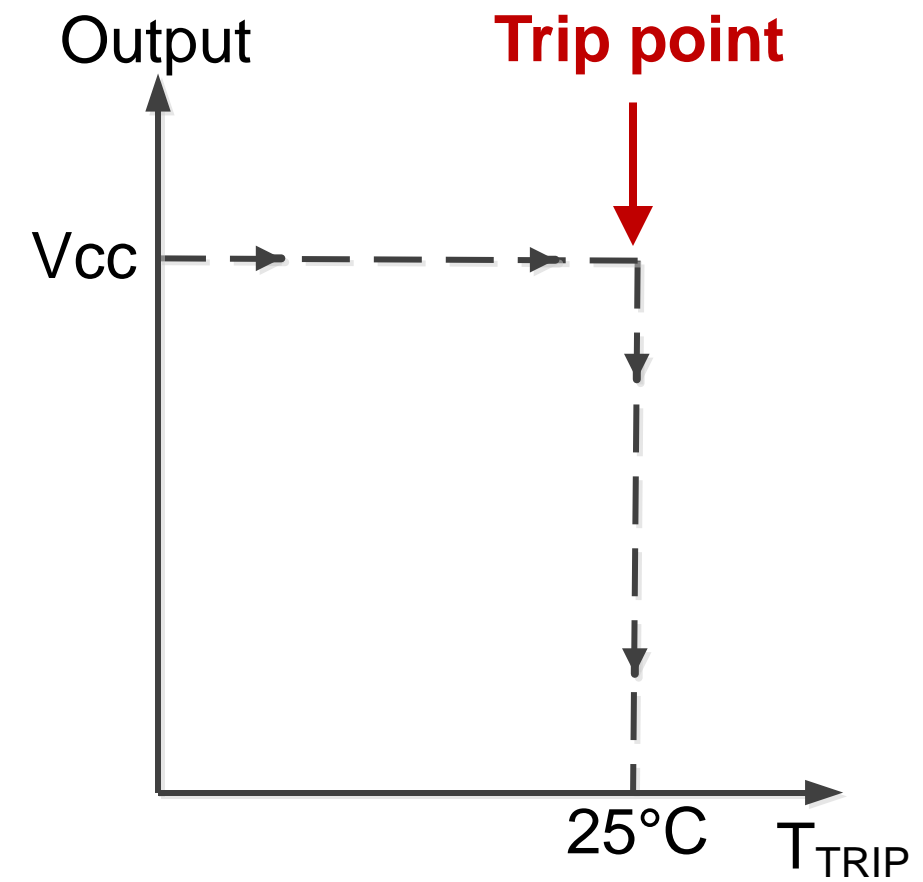
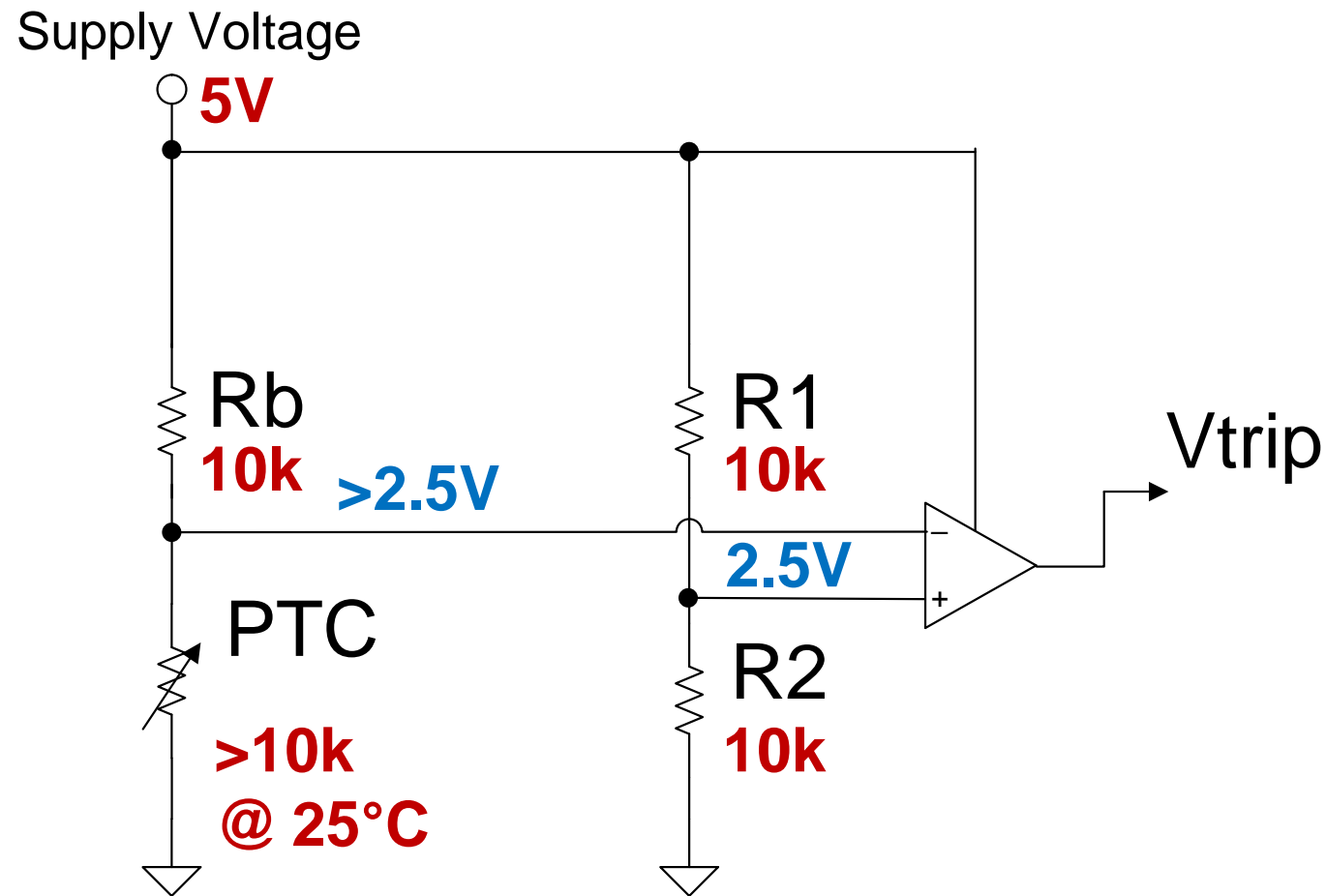


Two Channel Temperature Switch with Hysteresis

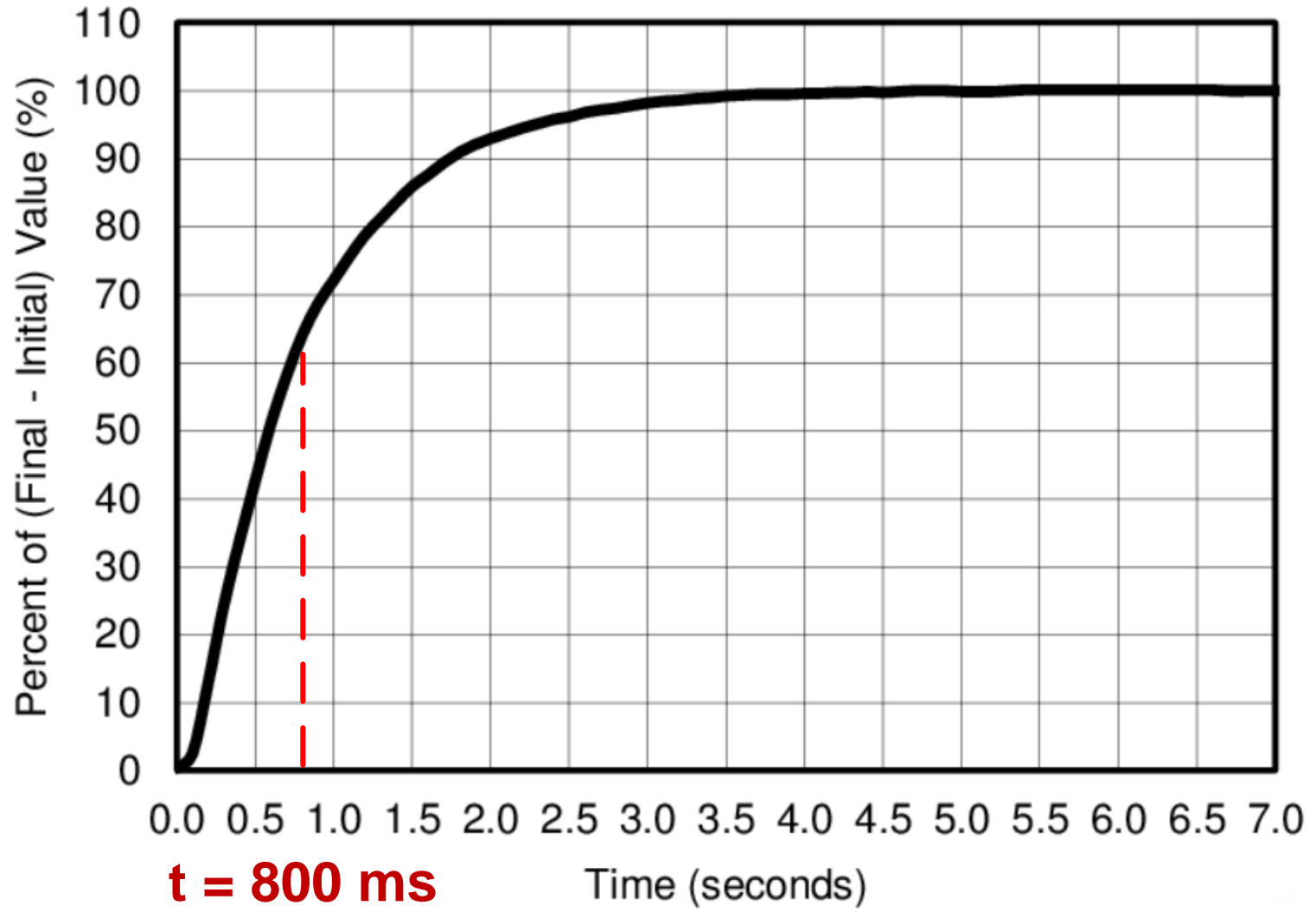


Protection/Prevention Methods

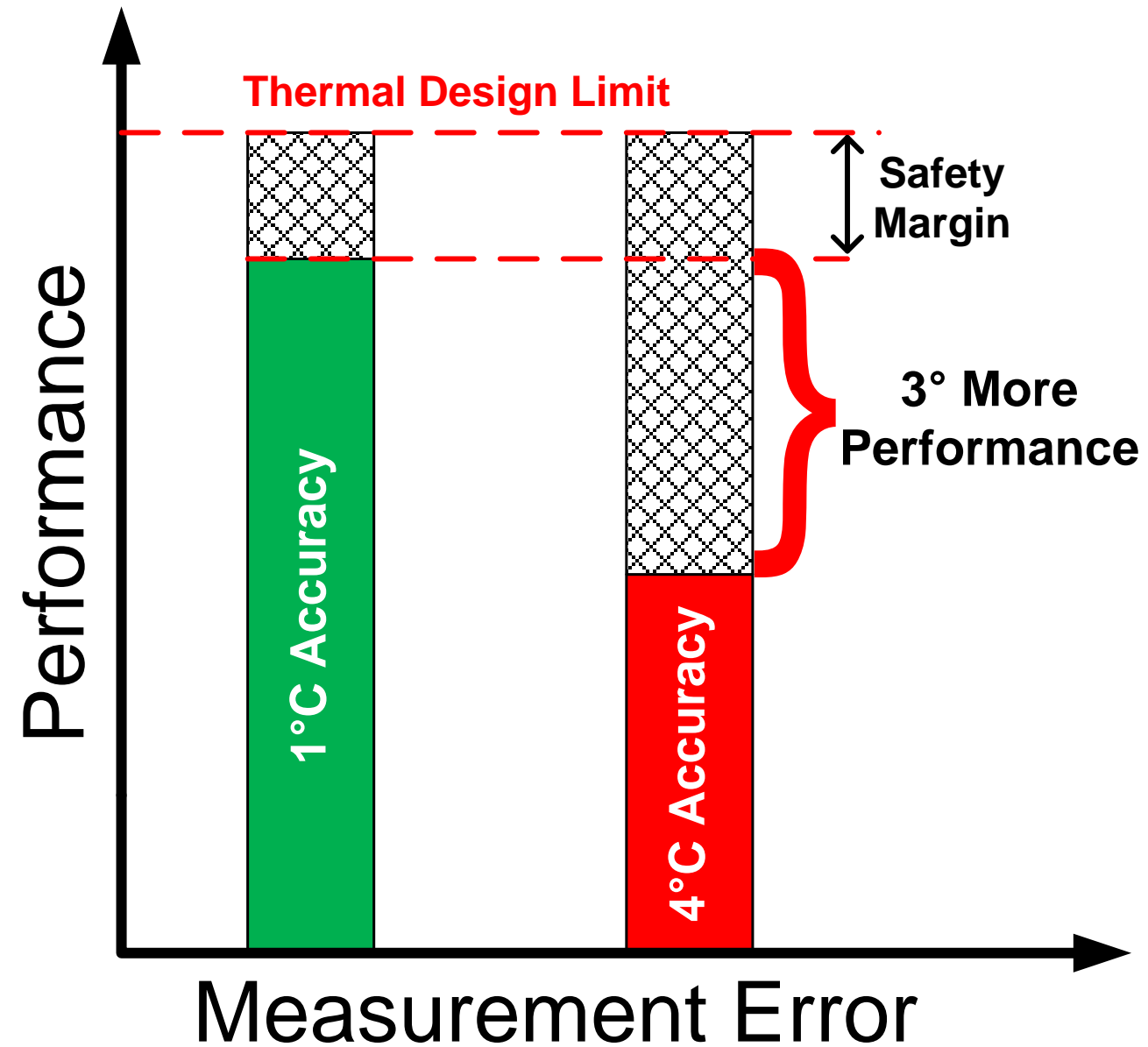
Thermistor with Comparator



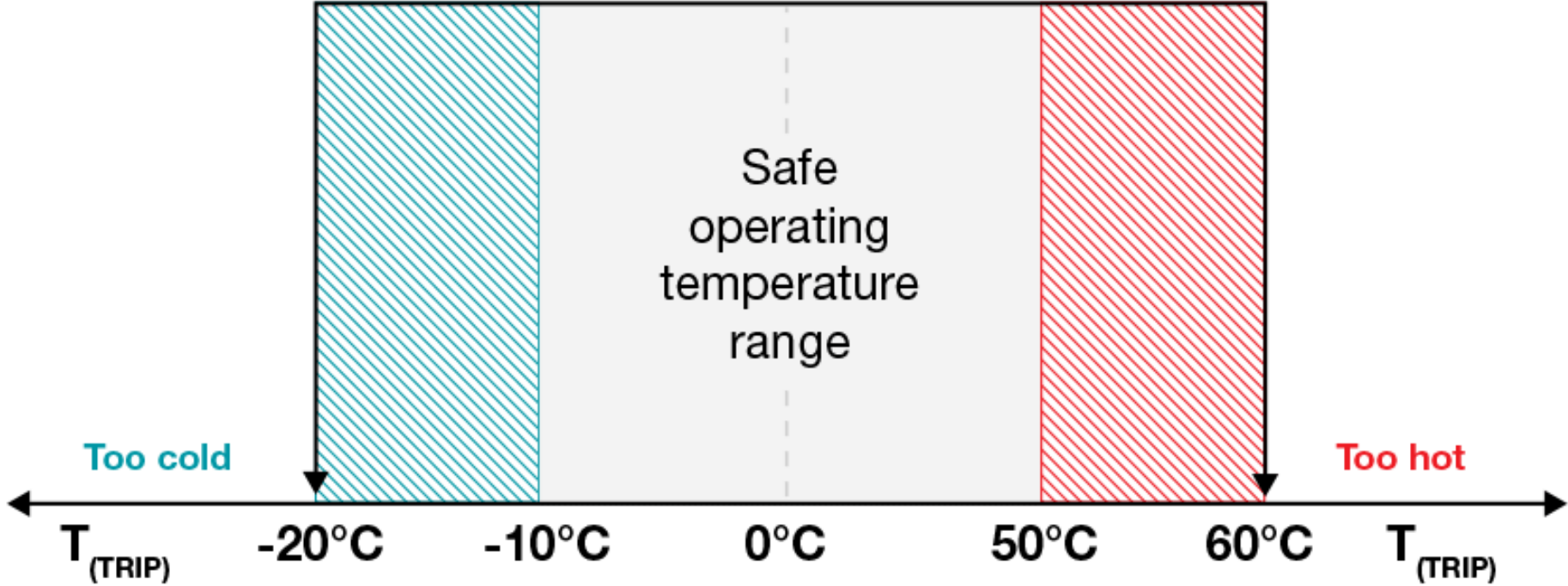
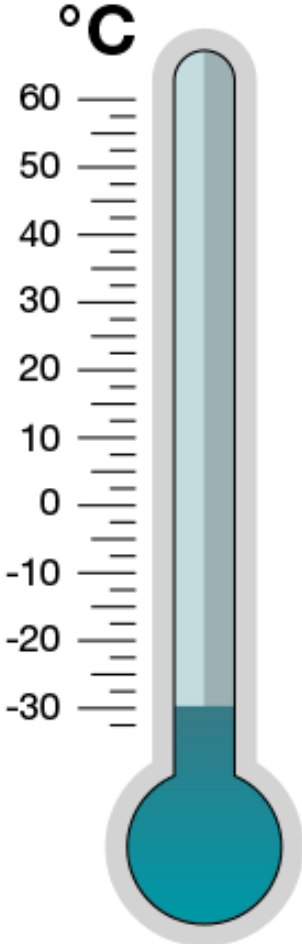
Response Time of the Sensor



Accuracy of the Sensor



Hysteresis of the Sensor Operation



Thank you!

To find more temperature sensor resources and products visit ti.com/temperature

Thermal Protection with Silicon Based Temperature Sensors

TI Precision Labs – Temperature Sensors

Quiz

Thermal Protection with Silicon Based Temperature Sensors– quiz

1. Which is not a basic circuit for temperature monitoring and detection?
 - a) Analog Temp Sensors
 - b) Thermistors
 - c) Digital Temp Sensors
 - d) RF Sensors

2. What is a difference in circuit requirements between Analog and Digital Based Temperature Sensors?
 - a) Power Supply Voltage
 - b) Pull-Up Resistors
 - c) GND
 - d) Signal read by MCU/ADC/ or Host Controller

Thermal Protection with Silicon Based Temperature Sensors– quiz

3. T/F Temperature Switches often provide a setting for hysteresis
 - a) True
 - b) False

4. The response time of a temperature sensor is referenced by the
 - a) Trip point
 - b) Accuracy
 - c) Thermal Repsonse
 - d) Turn on time

Thermal Protection with Silicon Based Temperature Sensors– quiz

5. T/F Dual channel Temperature Switches can have thresholds set for two “hot” temperatures.
- a) True
 - b) False

Answers

Thermal Protection with Silicon Based Temperature Sensors– quiz

1. Which is not a basic circuit for temperature monitoring and detection?
 - a) Analog Temp Sensors
 - b) Thermistors
 - c) Digital Temp Sensors
 - d) RF Sensors
2. What is a difference in circuit requirements between Analog and Digital Based Temperature Sensors?
 - a) Power Supply Voltage
 - b) Pull-Up Resistors
 - c) GND
 - d) Signal read by MCU/ADC/ or Host Controller

Thermal Protection with Silicon Based Temperature Sensors– quiz

3. T/F Temperature Switches often provide a setting for hysteresis

a) True

b) False

4. The response time of a temperature sensor is referenced by the

a) Trip point

b) Accuracy

c) Thermal Response

d) Turn on time

Thermal Protection with Silicon Based Temperature Sensors– quiz

5. T/F Dual channel Temperature Switches can have thresholds set for two “hot” temperatures.

a) True

b) False