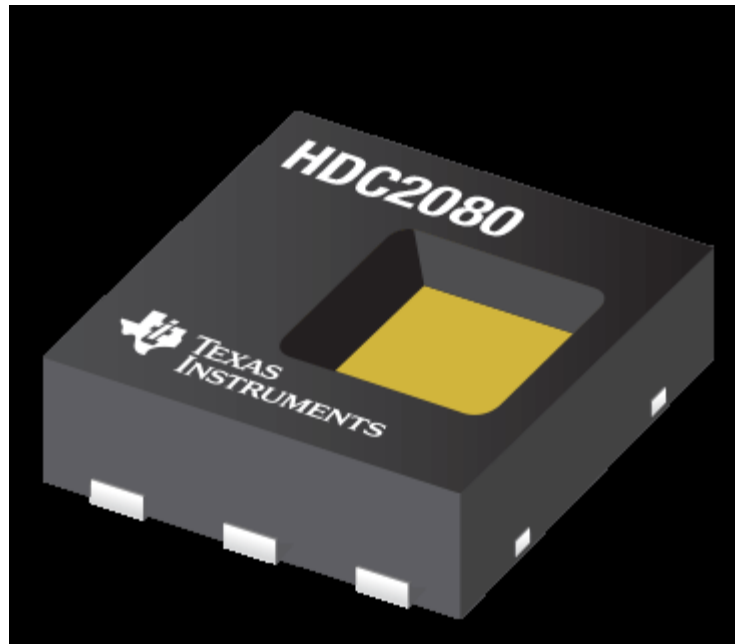


Considerations for Designing with Humidity Sensors

TI Precision Labs – Humidity Sensors

Presented and prepared by Brandon Fisher

Package selection

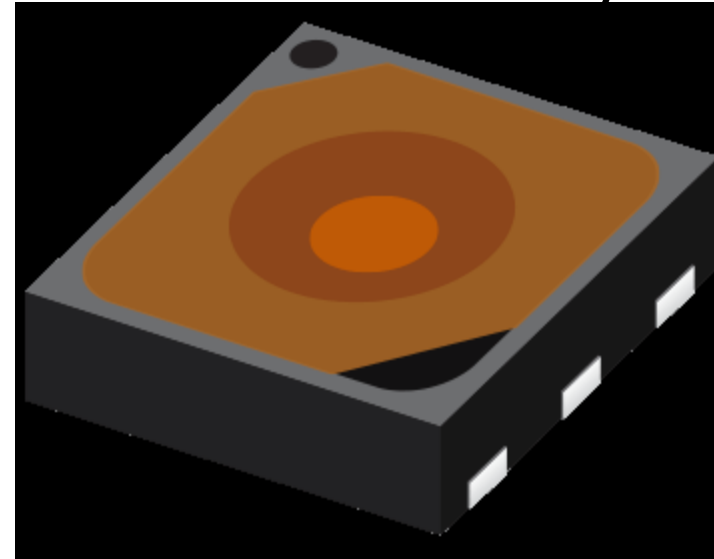


W CSP Style

Benefits

- Cost
- Ease of use

Protective Assembly Tape



Benefits

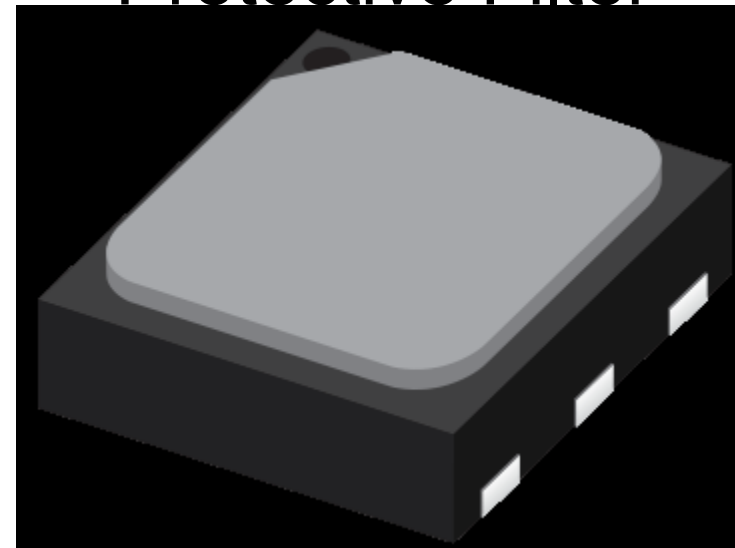
- Faster and cheaper assembly



Benefits

- Cost
- Size

Protective Filter



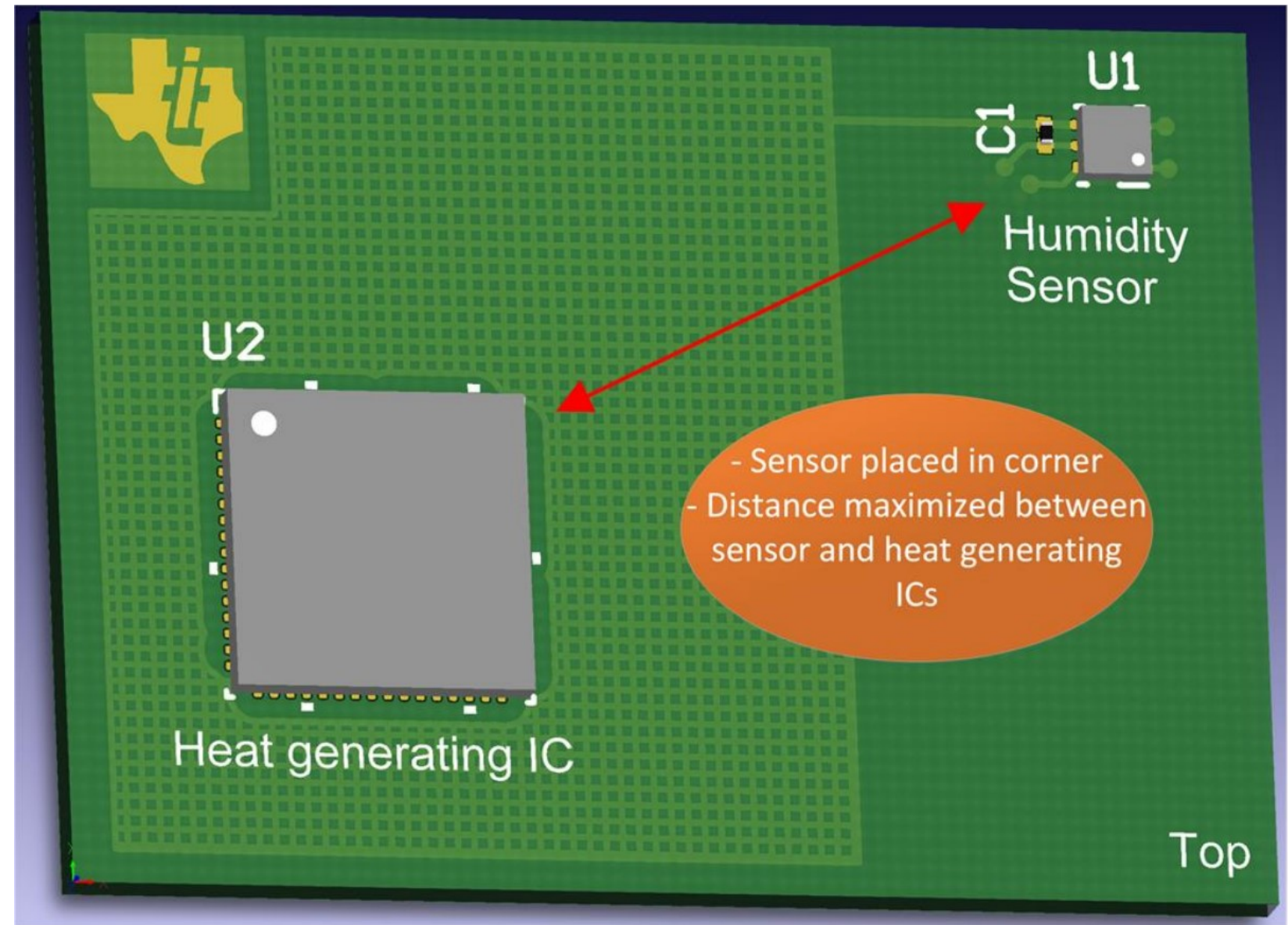
Benefits

- Dust and Moisture protection

Thermal design: Board layout

Thermal Layout

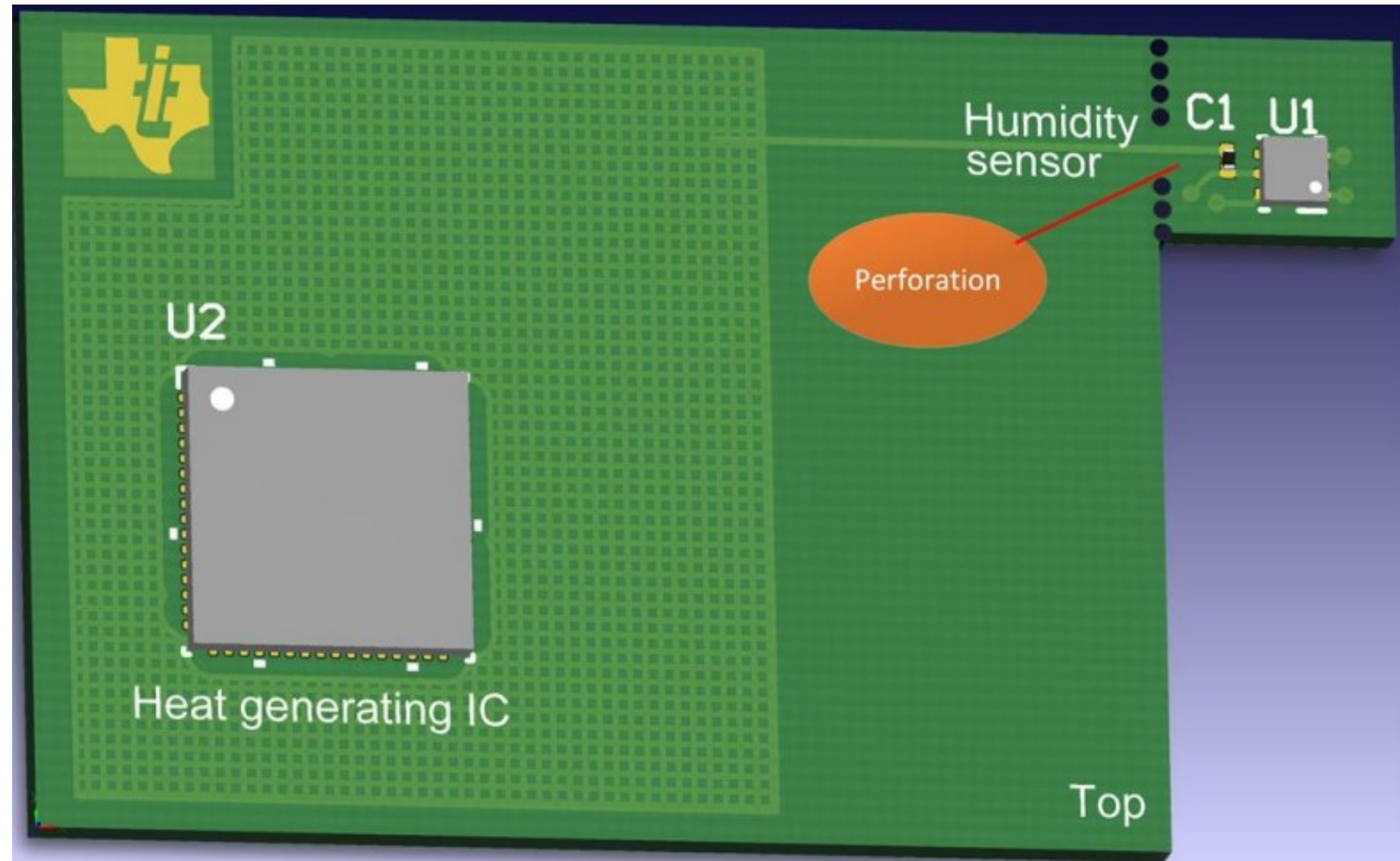
- Temperature accuracy is critical to RH Accuracy
- Maximize thermal resistance between sensor and error sources



Thermal design: Board layout

Thermal Layout

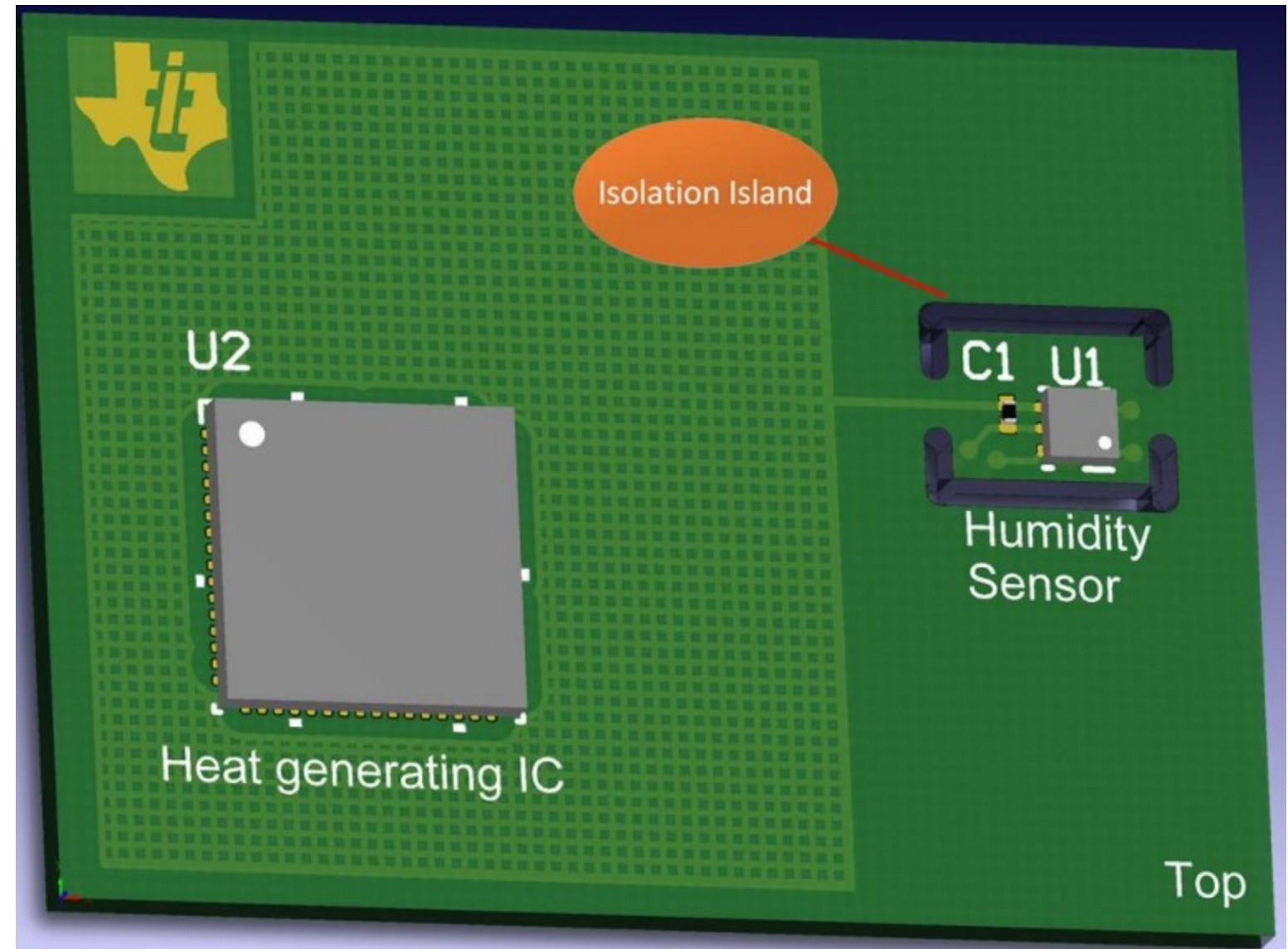
- Temperature accuracy is critical to RH Accuracy
- Maximize thermal resistance between sensor and error sources
- Cutouts, Islands, and perforations will reduce thermal conduction



Thermal design: Board layout

Thermal Layout

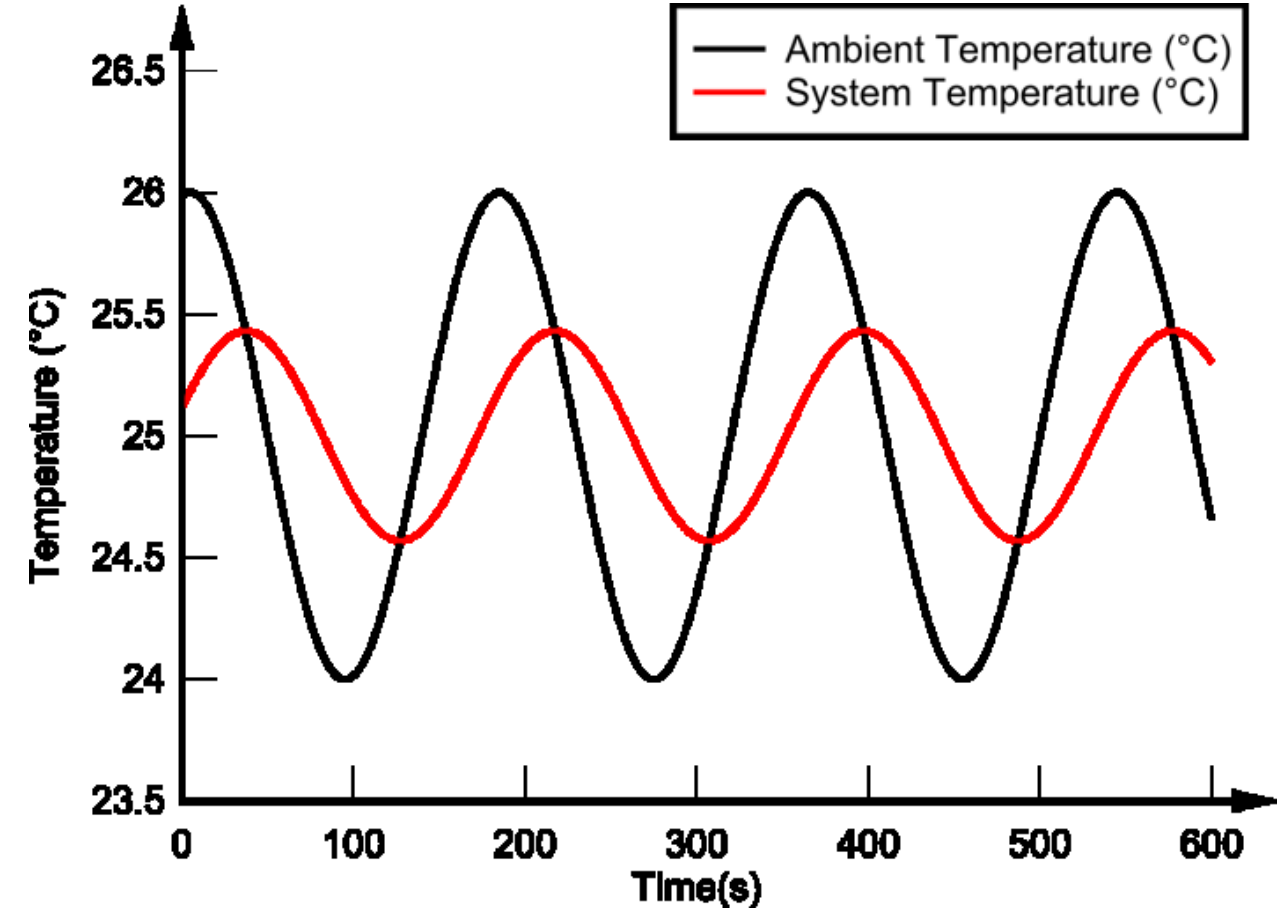
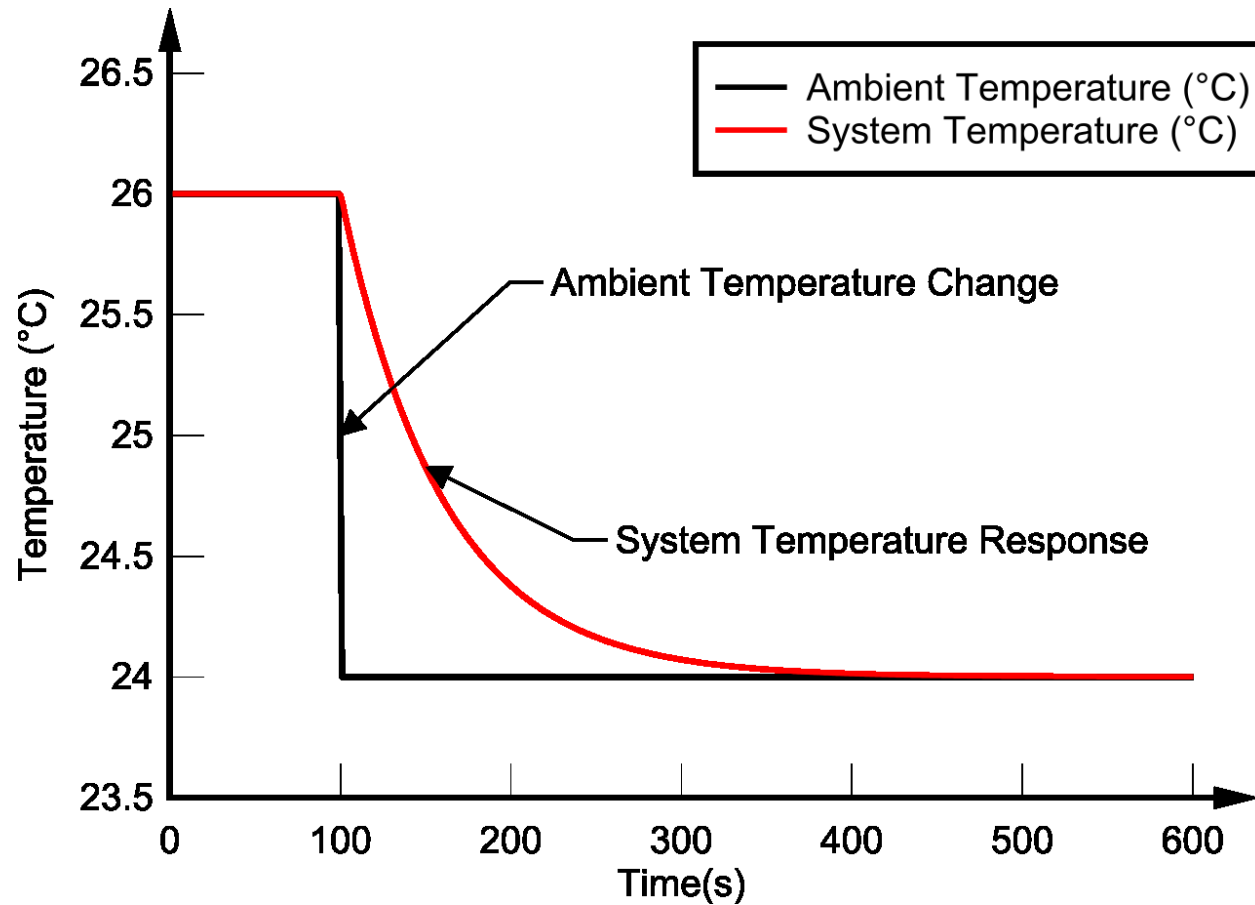
- Temperature accuracy is critical to RH Accuracy
- Maximize thermal resistance between sensor and error sources
- Cutouts, Islands, and perforations will reduce thermal conduction



Thermal design: Response time

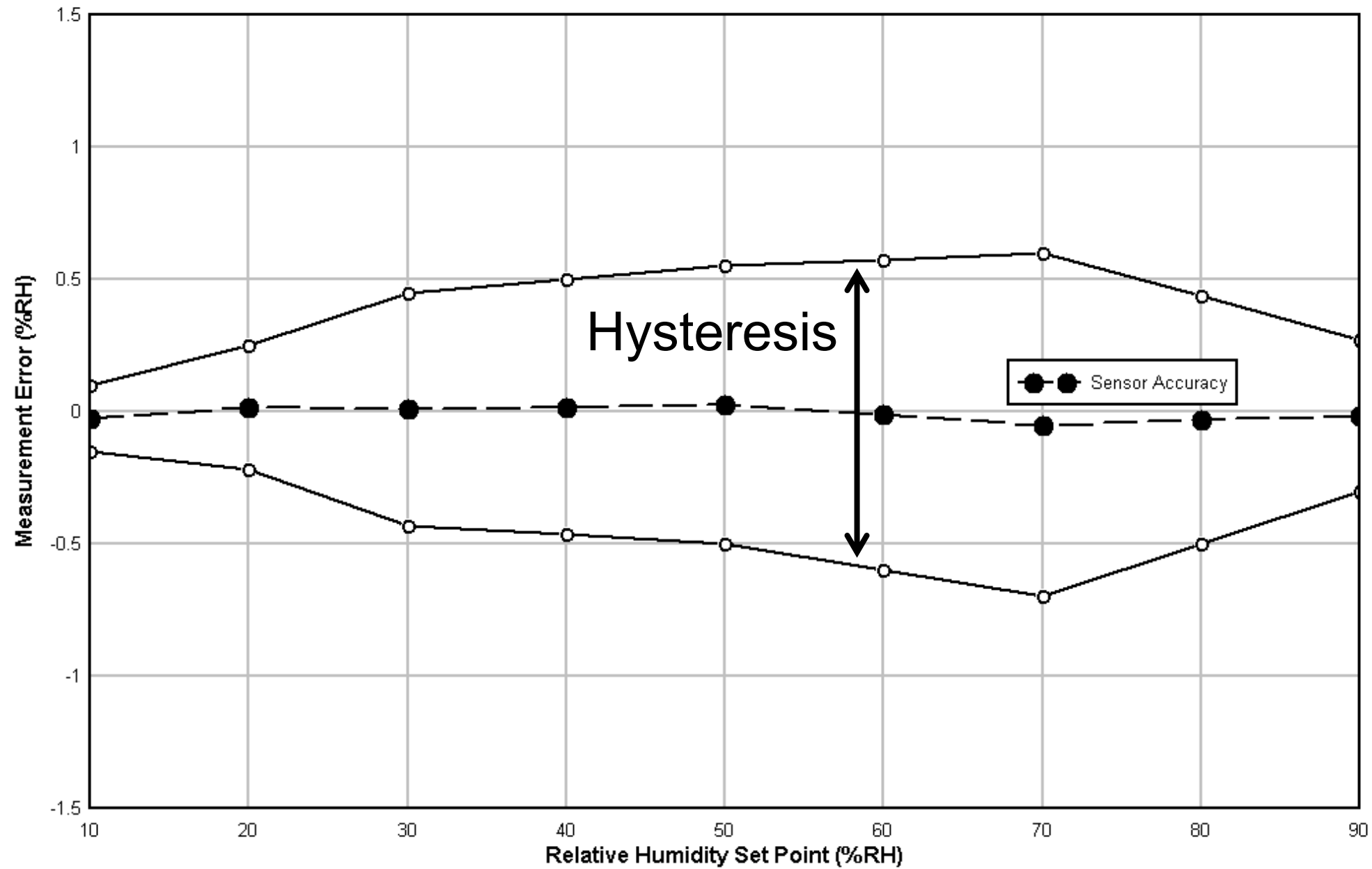
Rule of thumb:

1°C temp error → ~1%RH error



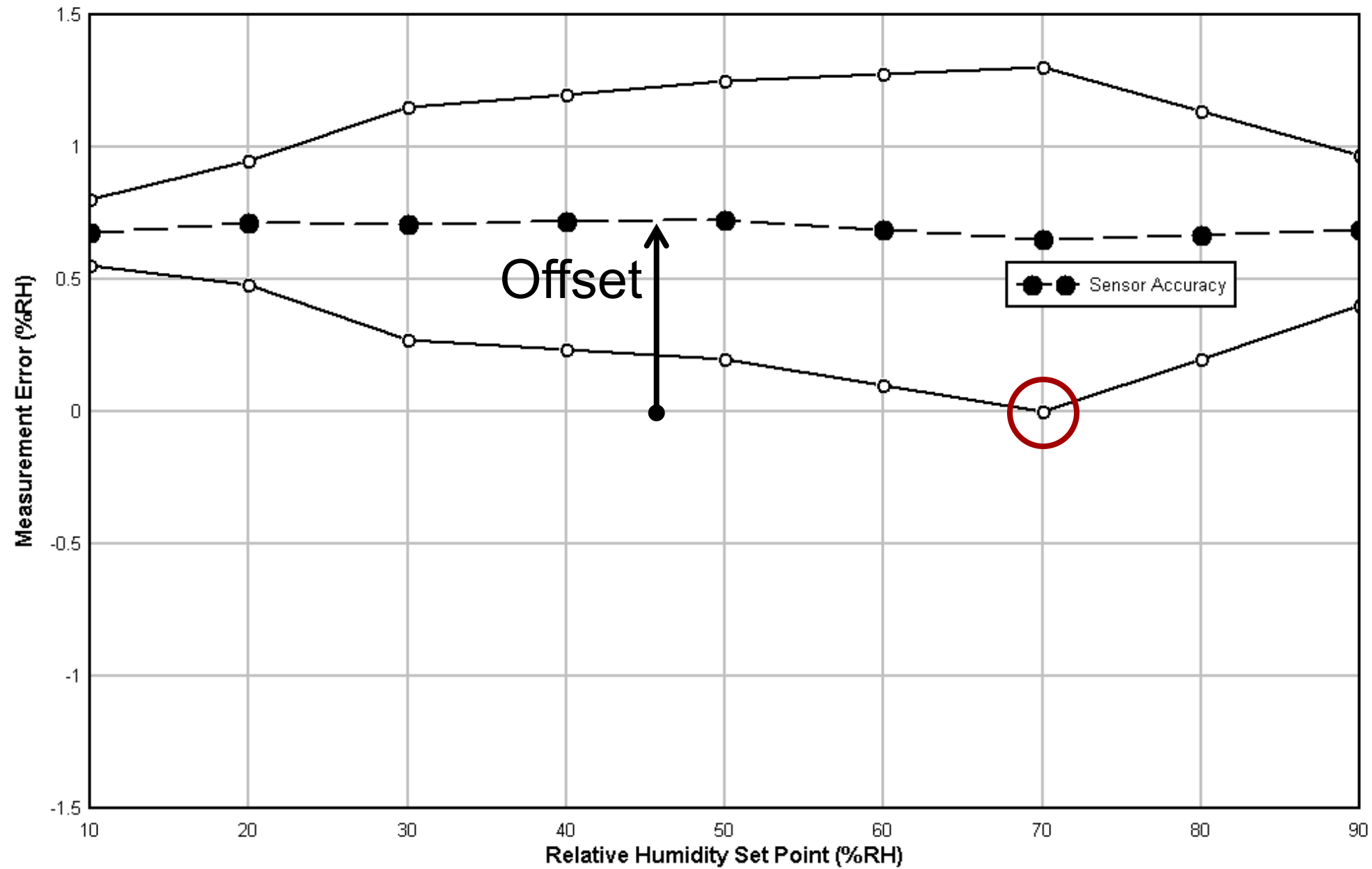
$$\tau = 60s$$

System RH accuracy and hysteresis



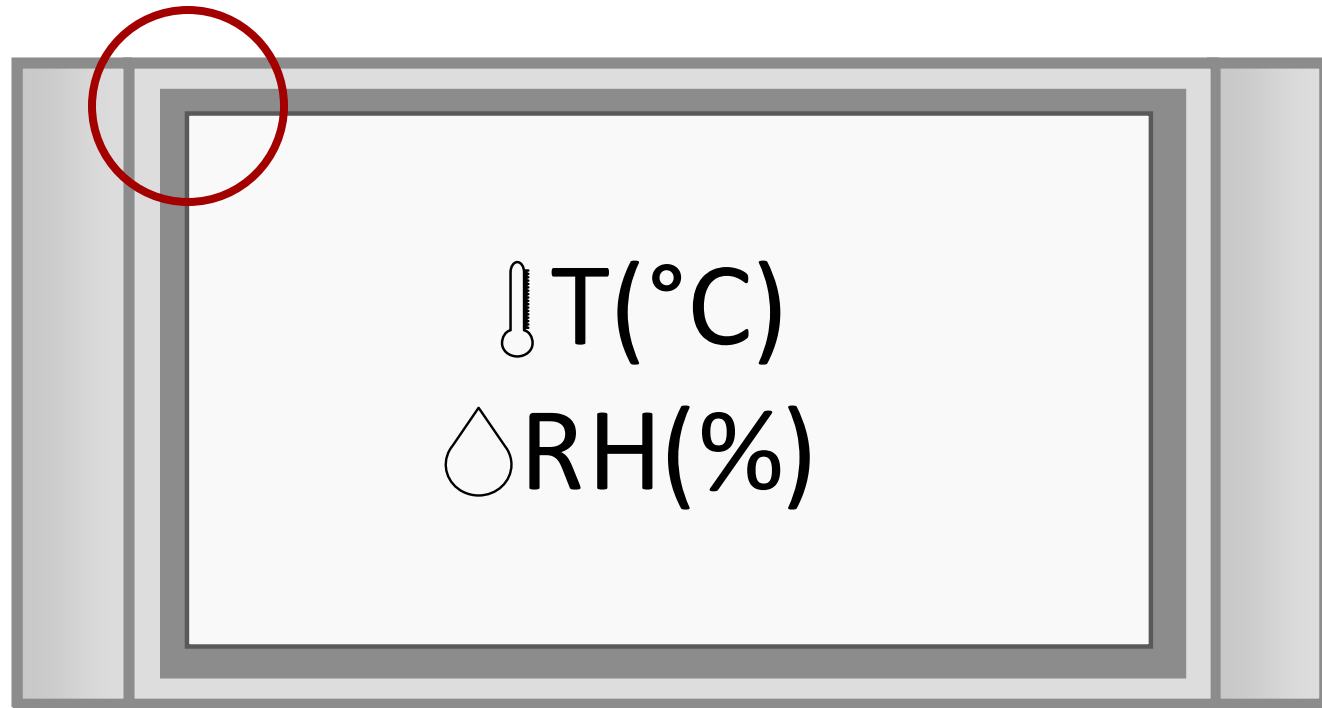
$$\text{Measurement Error} = \text{Sensor Reading} - \text{Reference Reading}$$

System RH accuracy and hysteresis

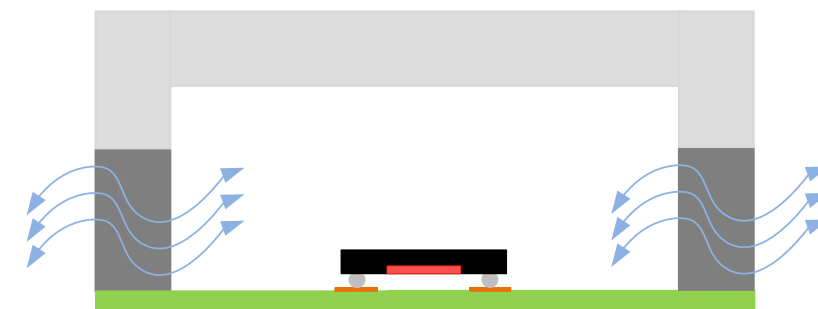
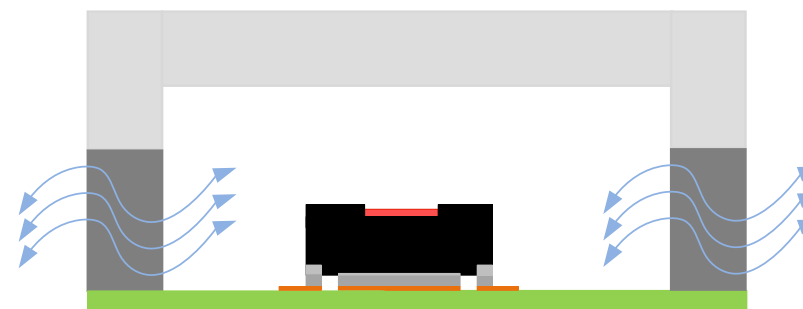
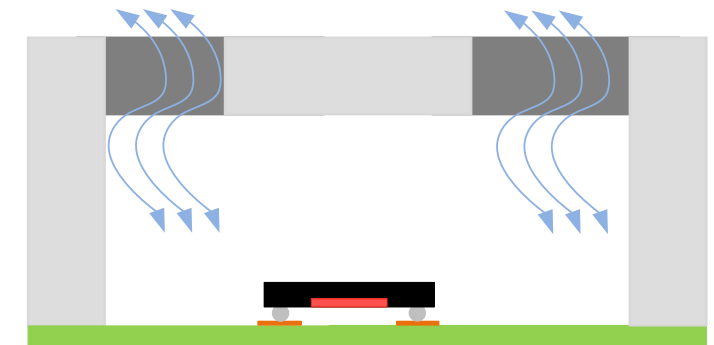
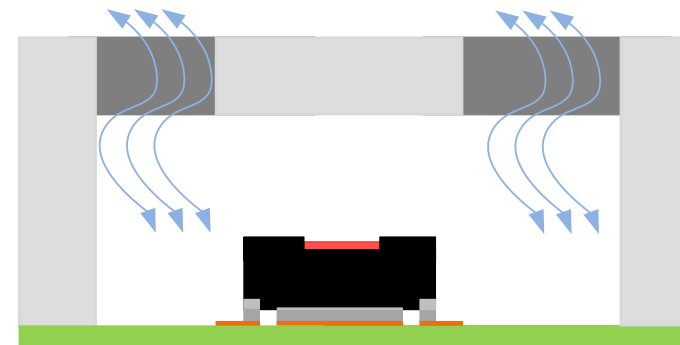
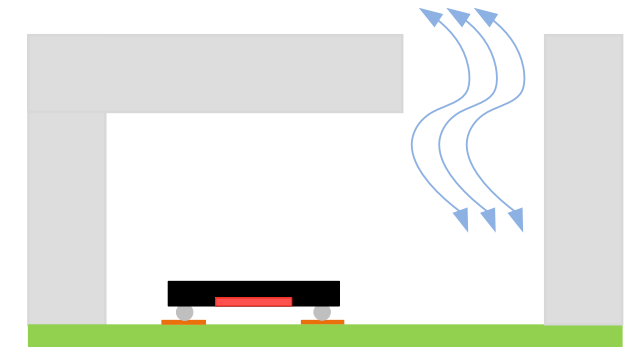
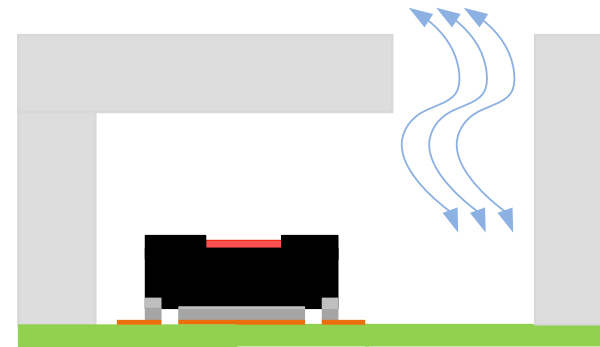
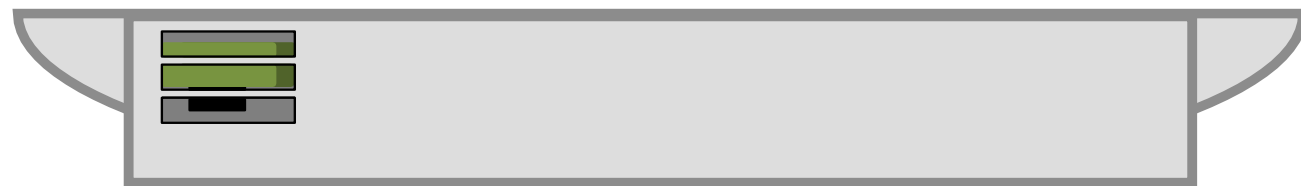


$$\text{Measurement Error} = \text{Sensor Reading} - \text{Reference Reading}$$

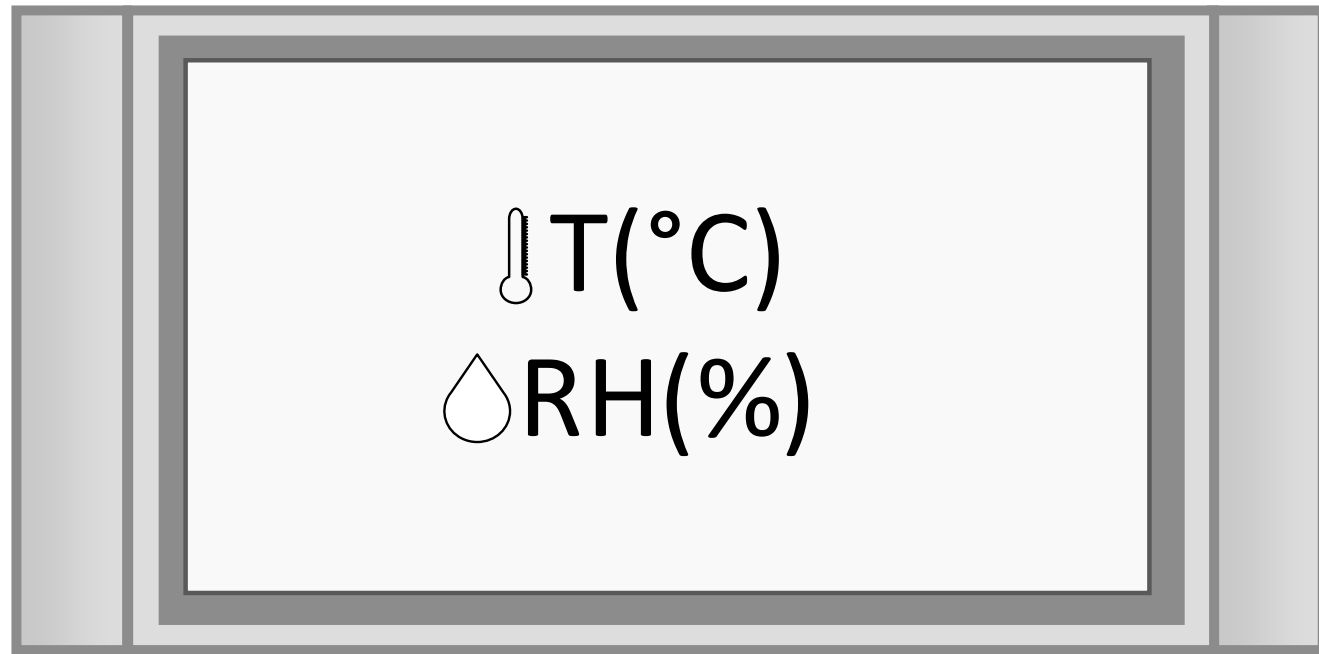
Case design for RH accuracy



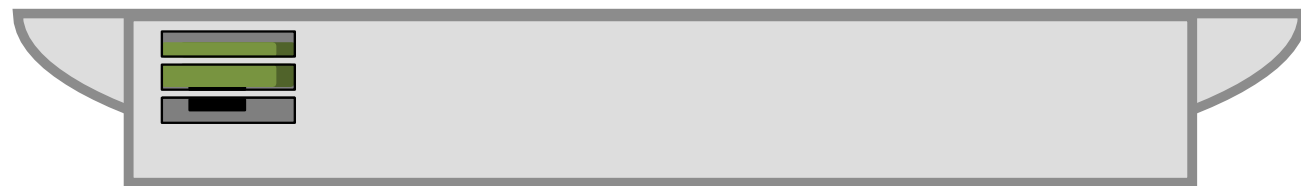
Top-Down View



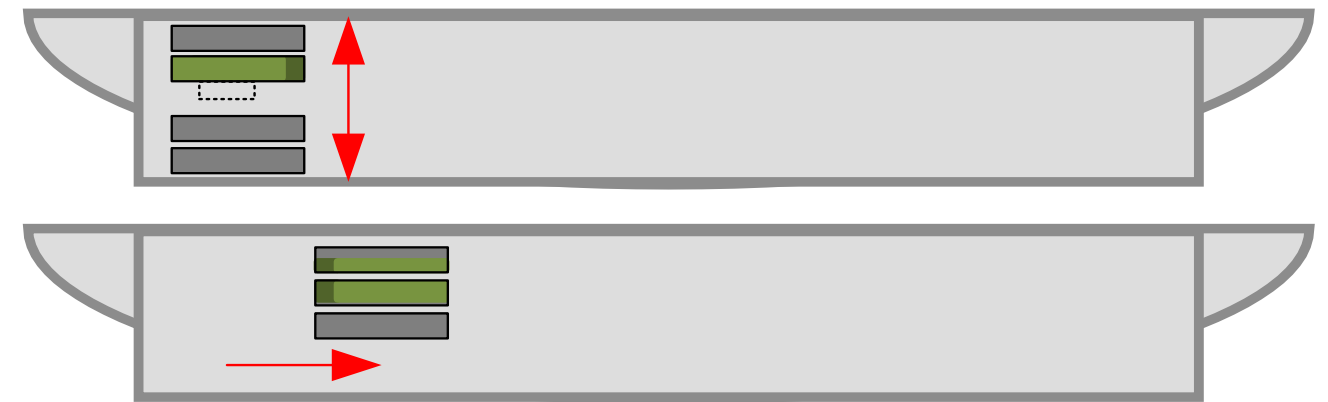
Case design for sensor protection



Top-Down View

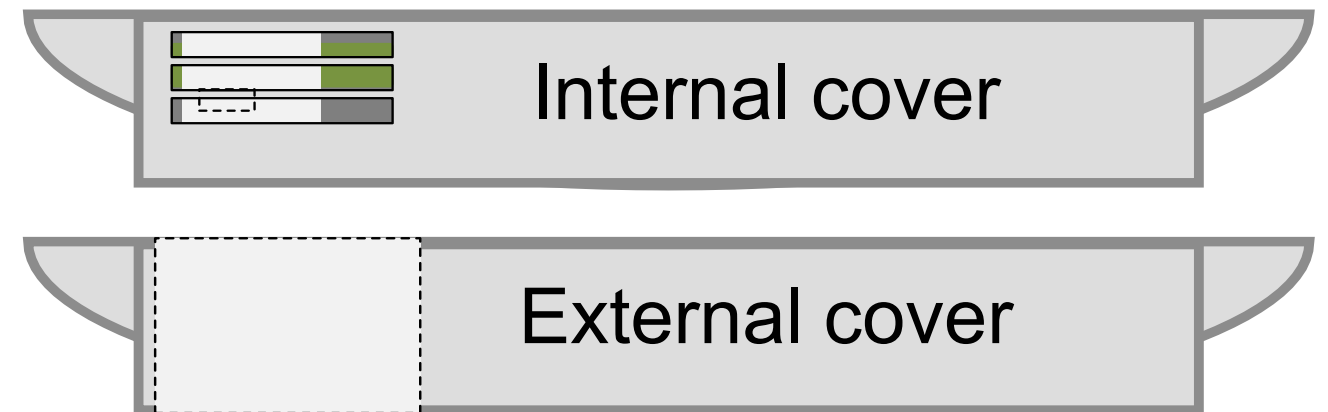


Offset vents



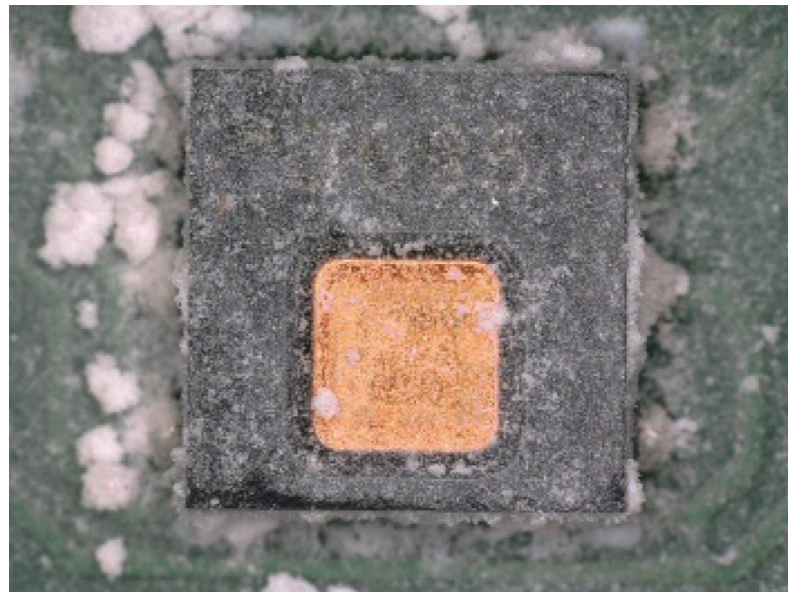
OR

Additional covering



Environmental conditions

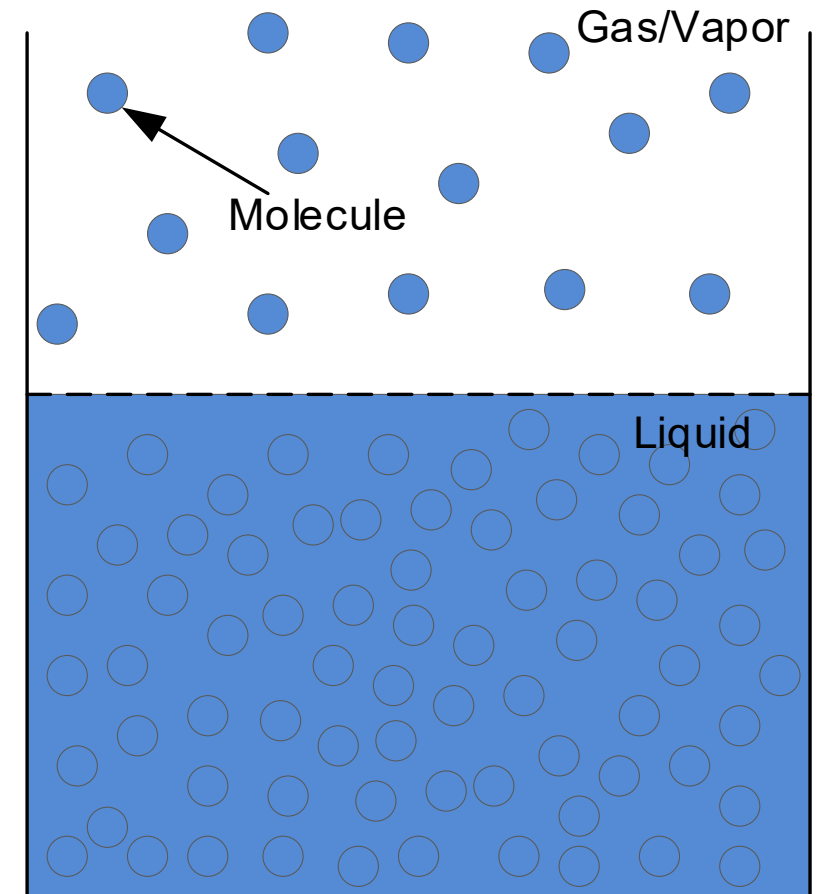
Liquid droplets Dust and particulates



Condensation
and precipitation



Vapors and gases



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