

IRX Sensor

Single-Chip Infrared Sensor

Applications

- Automotive
 - Auto cabin temperature control
 - Out-of-position occupant detection
 - Trapped occupant detection
 - Catalytic converter remote temperature sensing
- Medical
 - Tympanic thermometer
- Consumer and industrial
 - Microwave oven
 - Handhelds and portable instrumentation



Features

- Single chip infrared sensor
- Accuracies to ±1.0°F (±0.5°C)
- High resolution
- Calibrated analog outputs
- On chip temperature compensation
- TO-8 packaging



Amphenol Advanced Sensors

IRX Sensor Description

The IRX Sensor is a monolithically integrated single-chip infrared sensor. Integration of the compensation/calibration circuit onto the sensor chip provides high resolution with consistent accuracy. In addition, this single-chip sensor reduces the need for trouble-shooting since there is only one element to analyze.

The hot junctions of the thermopile are located near the center of the membrane, while the cold junctions are located on the bulk silicon rim. This temperature difference is converted to an electric potential by the thermo-electric effect in the thermopile junctions.

The integrated sensor also includes a temperature dependent, PTAT (proportional to absolute temperature) voltage output. This temperature reference is adjacent to the cold junctions on the bulk silicon rim and since the temperature reference is on the same substrate as the cold junctions, provides an accurate method of measuring the thermopile cold junction temperature.

Thus improving the overall sensor performance. Infrared energy is converted to thermal energy that causes a proportional change in thermoelectric voltage generated by the sensor. This voltage is sensed by the on-chip circuit and converted to a buffered (0 to 5V) output signal. The sensor operates on a single 5V supply.

Benefits

- Single chip solution
- Factory calibration
- High resolution
- Low cost
- Compact TO can packaging
- Consistent accuracy
- Remote temperature sensing

IRX Sensor Specifications

Electrical Characteristic

- Supply voltage: 5.0 VDC
- Output voltage: 0 to 5.0 VDC
- Supply current: 10 mA ±0.5

Thermo-electrical Characteristics

- *Sensitivity: 1.2 mV/°C
- *Responsitivity: 600 V/W
- Response time: 25 mSec
- Field of view may be tailored to customer requirements

Object Temperature Accuracy ±1.0°F (±0.5°C)

Temperature Range

Operating: -40° F to 185° F (-40° C to 85° C) Storage: -40° F to 257° F (-40° C to 125° C)

Drift: <0.05°C/three years

*Conditions: sensor is located 1 ft (.30 M) from black body silicon filter with 60% transmittance in the 7 to 15M range with a 0.039 in (1 mm) diameter aperture.



Functional Features

- Digital offset and gain calibration
- Non-volatile memory for calibration storage
- SPI bus for in system calibration
- On chip temperature reference
- Analog output
- Optional in-field self test feature



IRX Sensor Dimensions

IRX Sensor Specifications

	-40	-30	-20	-10	0	10	20	30	40	50	60	70	80
-40	2.50	2.38	2.26	2.14	2.02	1.90	1.78	1.66	1.54	1.42	1.30	1.18	1.06
-30	2.62	2.50	2.38	2.26	2.14	2.02	1.90	1.78	1.66	1.54	1.42	1.30	1.18
-20	2.74	2.62	2.50	2.38	2.26	2.14	2.02	1.90	1.78	1.66	1.54	1.42	1.30
-10	2.86	2.74	2.62	2.50	2.38	2.26	2.14	2.02	1.90	1.78	1.66	1.54	1.42
0	2.98	2.86	2.74	2.62	2.50	2.38	2.26	2.14	2.02	1.90	1.78	1.66	1.54
10	3.10	2.98	2.86	2.74	2.62	2.50	2.38	2.26	2.14	2.02	1.90	1.78	1.66
20	3.22	3.10	2.98	2.86	2.74	2.62	2.50	2.38	2.26	2.14	2.02	1.90	1.78
30	3.34	3.22	3.10	2.98	2.86	2.74	2.62	2.50	2.38	2.26	2.14	2.02	1.90
40	3.46	3.34	3.22	3.10	2.98	2.86	2.74	2.62	2.50	2.38	2.26	2.14	2.02
50	3.58	3.46	3.34	3.22	3.10	2.98	2.86	2.74	2.62	2.50	2.38	2.26	2.14
60	3.70	3.58	3.46	3.34	3.22	3.10	2.98	2.86	2.74	2.62	2.50	2.38	2.26
70	3.82	3.70	3.58	3.46	3.34	3.22	3.10	2.98	2.86	2.74	2.62	2.50	2.38
80	3.94	3.82	3.70	3.58	3.46	3.34	3.22	3.10	2.98	2.86	2.74	2.62	2.50
90	4.06	3.94	3.82	3.70	3.58	3.46	3.34	3.22	3.10	2.98	2.86	2.74	2.62
100	4.18	4.06	3.94	3.82	3.70	3.58	3.46	3.34	3.22	3.10	2.98	2.86	2.74
110	4.30	418	4.06	3.94	3.82	3.70	3.58	3.46	3.34	3.22	3.10	2.98	2.86
120	4.42	4.30	4.18	4.06	3.94	3.82	3.70	3.58	3.46	3.34	3.22	3.10	2.98

Ambient Temperature (°C)

Tobj = (Vir - 2.5)/0.012 + (Vtout - 2.5)/0.015 + 27

Vir = 2.5V + 0.012 (Tobj - Tamb)

Vtout = 2.5V + 0.015 (Tamb - 27)

Tobj = Object temperature

Object Temperature (°C)

- Tam = Ambient temperature
- Vir = Output voltage of the IR sensor

Vtout = Output voltage of the onboard temperature sensor

Amphenol Advanced Sensors

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