

NPX1

NovaSensor Sensors



The NPX1 sensor represents the next generation of Remote Tire Pressure Monitoring (RTPM).

NPX1 sensor adds a silicon pressure sensor, a 8-bit RISC processor, and an LF-input stage to meet market demands for flexible, customer specific behavior/solutions and overall system cost reduction.

A programmable version of the sensor is available, allowing the customer to download the application code in an electrically programmable ROM version. This sensor is intended for developing the application specific program. In order to ensure high reliability, the NPX1 sensor has the measurement routines (pressure, temperature, and supply voltage) implemented in ROM. Routines for LF reception and UHF transmission are also implemented in ROM.

Features

- 12 bit ADC
- 4k byte flash (E-ROM) for user application
- 4K ROM for library routines
- 128 byte RAM
- 128 byte EEPROM
- Battery management—minimizing power consumption
- Measure and compensate pressure,
- Media compatibility with tire pressure media
- 450, 700, and 1400 kPa absolute pressure ranges
Custom ranges are available
- On chip temperature sensor
- On chip temperature shut down

NPX1 Specifications

General

Operating Temperature

-40°F to 257°F (-40°C to 125°C)

Storage Temperature

-67°F to 257°F (-55°C to 125°C)

Battery Supply Voltage

2.1 to 3.6 V (3.0 V typical)

Supply Current

600 nA typical power down current at 3.6 V

Pressure Ranges

100 to 450, 100 to 700, 0 to 1400 is typical

450 kPa Resolution

- 1.37 kPa/LSB (450 kPa to 100 kPa/255)
- -40°F to 257°F (-40°C to 125°C)

700 kPa Resolution

- 2.35 kPa/LSB (700 kPa to 100 kPa/255)
- -40°F to 257°F (-40°C to 125°C)

1400 kPa Resolution

- 5.49 kPa/LSB (1400 kPa to 0 kPa/255)
- -40°F to 257°F (-40°C to 125°C)

Over Pressure

10x

Pressure Measurement

Measurement Accuracy (2.1 to 3.6 V)

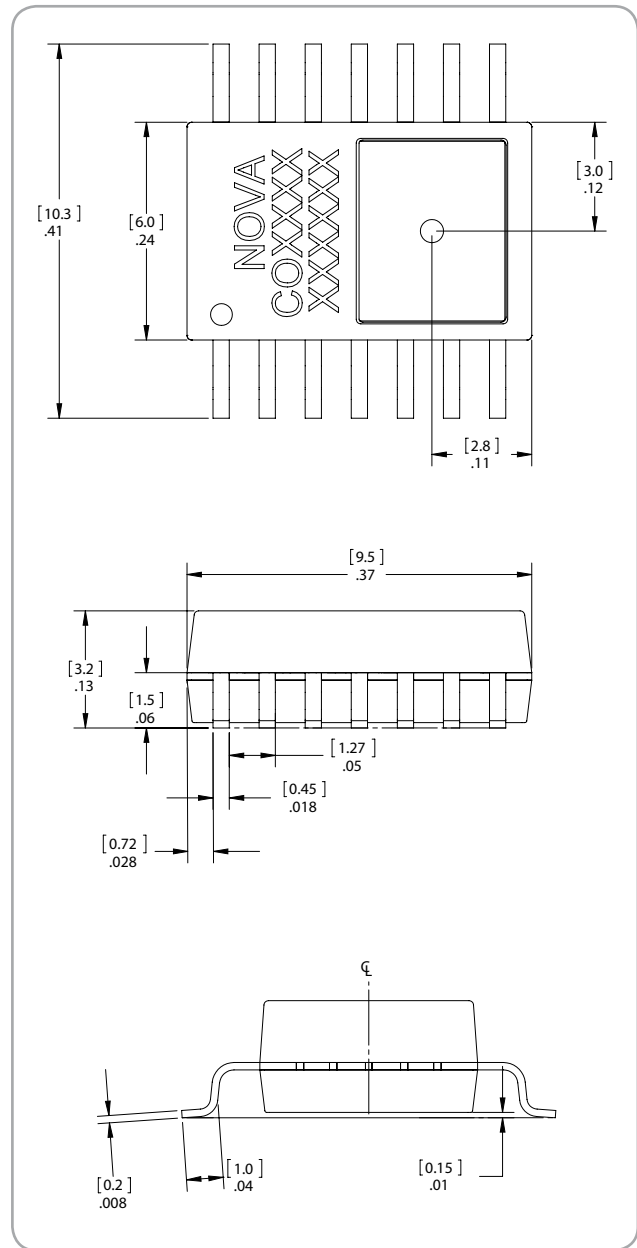
- -6 to 6 LSB (6 σ capability), 32°F to 122°F (0°C to 50°C)
- -8 to 8 LSB, -40°F to 257°F (-40°C to 125 °C)

Charge Consumption (All Pressure Ranges)

3.2 micro-coulombs; 77°F (25°C), 3V

Battery Voltage Measurement

- ± 6 LSB, -40°F to 257°F (-40°C to 125°C)
- 1 LSB = 10.8 mV/LSB
- 0.4 micro-coulombs charge consumption



NPX1 dimensions in [mm]

Pressure Measurement

Measurement Accuracy (2.1 to 3.6 V)

- -6 to 6 LSB (6 σ capability), 32°F to 122°F (0°C to 50°C)
- -8 to 8 LSB, -40°F to 257°F (-40°C to 125 °C)

Charge Consumption (All Pressure Ranges)

3.2 micro-coulombs; 77°F (25°C), 3V

Battery Voltage Measurement

- ± 6 LSB, -40°F to 257°F (-40°C to 125°C)
- 1 LSB = 10.8 mV/LSB
- 0.4 micro-coulombs charge consumption

NPX1 Specifications

Temperature Measurement

Temperature Range

-40°F to 257°F (-40°C to 125°C)

Resolution

1.0 °C/LSB; 401°F (-58°F)/255
(205°C -(-50°C)/255)

Measurement Accuracy (6FFcapability)

- ±10.8°F (±6°C), -4°F to 158°F (-20°C to 70°C)
- ±14.4°F (±8°C), -40°F to 257°F (-40°C to 125°C)

Measurement Charge Consumption (77°F (25°C), 3.0 V)

- 0.8 micro-coulombs

Temperature Maximum

SHTD represents the temperature at which the thermal shut-down function can be enabled and REL represents the temperature at which the master reset state is released.

SHTD

- 239°F (115°C) maximum
- 2.1 to 3.6 V
- Thermal shut-down enabled

REL

- 212°F (100°C) minimum
- 2.1 to 3.6 V
- Master reset release

Voltage Minimum

The voltage at which the Vmin-circuit will return a low battery voltage status is specified in Vmin:

Vmin

- 2.0 to 2.2 V (2.1 V typical)
- -40°F to 257°F (-40°C to 125°C)

Transfer Functions

450 kPa Pressure

$$P = 1.3725 \times Po + 100$$

P = Pressure in kPa

Po = 8 bit scaled output pressure

700 kPa Pressure

$$P = 2.3529 \times Po + 100$$

P = Pressure in kPa

Po = 8 bit scaled output pressure

1400 kPa Pressure

$$P = 5.490 \times Po$$

P = Pressure in kPa

Po = 8 bit scaled output pressure

Temperature

$$T = To - 50$$

T = Temperature in °F (°C)

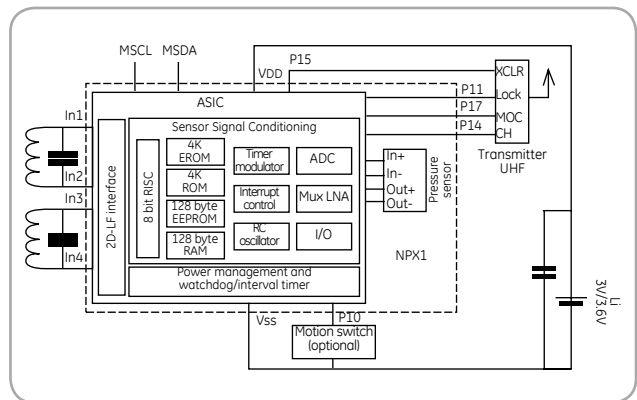
To = 8 bit scaled output temperature

V Battery

$$V = 0.0108 \times Vo + 4$$

V = V Battery in V

Vo = 8 bit scaled output Vbattery



NPX1 block diagram

NPX1 Specifications

Detailed Performance

| Pin | Name | Function | Note |
|-----|------|--|------|
| 1 | IN4 | LF receiver channel 2, negative input | |
| 2 | P10 | General purpose I/O with external wakeup feature, internal pull-up/pull-down | 1 |
| 3 | P11 | General purpose I/O with external wakeup feature, internal pull-up/pull-down | |
| 4 | MSDA | Monitor Serial Data I/O with internal pull-up | 3 |
| 5 | MSCL | Monitor Serial Clock output | 3 |
| 6 | VDD | Battery supply voltage (positive terminal) | |
| 7 | NC | | |
| 8 | VSS | Common ground (negative terminal) | |
| 9 | P17 | General purpose I/O or Modulator for UHF transmitter | 2 |
| 10 | P15 | General purpose I/O or external system clock reference input | |
| 11 | P14 | General purpose I/O or Modulator for UHF transmitter | 2 |
| 12 | IN1 | LF receiver channel 1, positive input | |
| 13 | IN2 | LF receiver channel 2, negative input | |
| 14 | IN3 | LF receiver channel 2, positive input | |

- 1) P10/P11 inputs have internal pull-up and must be left unconnected if not in use.
- 2) The functions of P14 and P17 may be interchanged by software.
- 3) Actual pad function determined by boot sequence. MSCL is an output and must be unconnected in the application. MSDA feature an on-chip pull-up to VBAT may be left open or terminated to VBAT in the application.

Ordering Information

Use this code when ordering

| NPX-C017 | | |
|----------|-------------|---------------|
| Code | Description | Shipping |
| 67 | 450 kPa | Tape and reel |
| 68 | 700 kPa | Tape and reel |
| 69 | 1400 kPa | Tape and reel |

NPX-C017 ___ - _T__ Typical model number

Notice

The customer has sole responsibility for designing and implementing a solution, which will ensure safe operation including review of appropriate reliability, required redundancy, mitigation of failure modes and meeting appropriate standards. The customer is responsible for review of any conditions for use including, but not limited to: environmental conditions, electrical supply and residual risk.