

# NPI-19 Series Digital Pressure Sensor I<sup>2</sup>C



# **Applications**

- Industrial process control
- Corrosive fluid and gas measurement
- Hydraulic systems and valves
- Tank level measurement
- Barometric pressure measurement
- Ship and marine systems
- Aircraft and avionic systems
- Medical equipment

### **Features**

- No port or threaded process fittings
- Linearity: ±0.25% FSO (BFSL)
- Total Error Band: ±1% FSO
- I<sup>2</sup>C interface protocols
- 14-bit I<sup>2</sup>C output
- Absolute and gauge pressure
- Pressure Ranges: 2.5 psi (17 kPa) to 300 psi (2068 kPa)



# **NPI-19 Series - Specifications**

#### **Pressure Output:**

- 10% to 90% VDD
- **Device Address:**
- I<sup>2</sup>C (Addr 0x28H)
- Supply Voltage:
- 3.3V

Linearity:

- ±0.25% FSO
- **Total Error Band:**
- ±1% FSO
- Over Pressure:
- 2X
- Burst Pressure:
- 3X

#### Long Term Stability:

- ± 0.5% span / year typical
- **Operating Temperature:**
- -40°C to 125°C

#### Storage Temperature:

-40°C to 125°C







MARKING AREA





NPI-19M Dimensions (mm)

### Sensor Output

Parameters	Typical	Units	Notes
Applied Pressure Pmin	1638	Decimal count	666 Hex count
Applied Pressure Pmax	14745	Decimal count	399A Hex count

# NPI-19 Series - Specifications (Cont.)

## Absolute Maximum Ratings

Symbol Parameter		Limits			Unit	
Symbol	Parameter	Min	Typical	Max	Offic	
$V_{dd}$	Supply Voltage	2.5	3.3	5.5	V	
Р	Over Pressure (Rated Pressure)	-	2X	-	-	
V <sub>HBM1</sub>	Electrostatic Discharge Tolerance – Human Body Model	-	-	4	kV	
T <sub>STOR</sub>	Storage Temperature	-40	-	125	°C	

## **Performance Specifications**

Unless otherwise specified: Supply Voltage: 3.3 VDC, Ambient Temperature: 25°C

Parameters	Min	Typical	Max	Units	Notes
Zero Output (10%~90%)		1638		Decimal counts	1
Full-Scale Pressure Output 10%~90%)		14745		Decimal counts	1
Pressure Linearity	-0.25		0.25	%FSO	2
Total Error Band	-1		1	%FSO	2
Pressure Resolution		0.008		%FSO	3
Supply Current		3		mA	
Insulation Resistance (@50 VDC)	100			MΩ	4
Overpressure			2X	Rated pressure	
Load Resistance	10			ΚΩ	
Long-Term Stability		0.5		%FSO/year	
Compensated Temperature ( ≤35 kPa)	0		50	°C	
Compensated Temperature ( ≥100 kPa)	-20		85	°C	
Operating Temperature ( ≤35 kPa)	-10		80	°C	5
Operating Temperature (≥100 kPa)	-40		125	°C	5
Start Time to Data Ready			8.4	ms	6
I <sup>2</sup> C Slave Address		0x28		Counts Hex	
Media	Liquids and gases compatible with 316L Stainless Steel				

1. 666 to 399A Hex counts.

Accuracy: Combined BFSL linearity, pressure hysteresis and repeatability.
Total Error Band: Calibration errors and temperature effects over compensated range.

4. Between case and sensor pins.

5. Temperature range may be less with connectors or wires.

6. Start Time to Data Ready is the time after Power on Reset (POR) to obtain valid data.

# **NPI-19 Series - Functional Description**

# I<sup>2</sup>C

In I<sup>2</sup>C Mode, each command is started as shown in Figure 1. Only the number of bytes that is needed for the command has to be sent. After the execution of a command (busy = 0) the expected data can be read as illustrated in Figure 3, or if no data are returned by the command the next command can be sent. The status can be read at any time as described in Figure 2.



Figure 1 - I<sup>2</sup>C Command Request



Figure 2 - I<sup>2</sup>C Read Status



Figure 3 - I<sup>2</sup>C Read Data

All mandatory l<sup>2</sup>C-bus protocol features are implemented. Optional features like clock stretching, 10-bit slave address, etc., are not supported by the sensor's interface.

In I<sup>2</sup>C-High Speed Mode, a command consists of a fixed length of three bytes.

## I<sup>2</sup>C Parameters

Parameter	Symbol	Min.	Max.	Units
SCL clock frequency	f <sub>FCL</sub>	100	400	kHz
Start condition hold time relative to SCL edge	t <sub>HDSTA</sub>	0.1		μS
Minimum SCL clock low width 1)	t <sub>LOW</sub>	0.6		μS
Minimum SCL clock high width <sup>1)</sup>	t <sub>HIGH</sub>	0.6		μS
Start condition setup time relative to SCL edge	t <sub>susta</sub>	0.1		μS
Data hold time on SDA relative to SCL edge	t <sub>HDDAT</sub>	0		μS
Data setup time on SDA relative to SCL edge	t <sub>sudat</sub>	0.1		μS
Stop condition setup time on SCL	t <sub>susto</sub>	0.1		μS
Bus free time between stop condition and start condition	t <sub>BUS</sub>	2		μS
<sup>1)</sup> Combined low and high widths must equal or exceed minimum SCLK period.				

# I<sup>2</sup>C Timing Diagram



## **Output Transfer Function**



P (max) - P (min)

Pressure	% Output	Decimal Counts	Hexadecimal Counts
Pmin	10	1638	0x0666
Pmid	50	8192	0x2000
Pmax	90	14746	0x399A

Where:

Output (max) = 14746 decimal counts

Output (min) = 1638 decimal counts

# NPI-19 Series - Ordering Information



#### NPI-19 NovaSensor Digital Pressure Sensor

Custom pressure ranges and cable options available upon request.

### Warranty

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