

NPB 102

Digital Output Absolute Pressure Sensor

Applications

- Automobile Applications Thermal Runaway Detection, Infotainment, and Enhanced GPS Navigation
- Mobile Devices Smart Phones, Smart Watches, and Tablets
- Indoor and Outdoor Navigation
- Altimeter and Barometer for Portable Devices
- Weather Station Equipment
- Leisure and Sports
- Hard Disk Drive (HDD)
- Weather Forecast
- Consumer Drones

Features

- Absolute Pressure Range: 260 mBar to 1260 mBar and 50kPa to 200kPa (Other pressure ranges available upon request)
- Pressure Resolution: 18-bit, Temperature Resolution: 16-bit
- Operating Temperature: -40°C to +125°C
- Pressure Accuracy (Total Error Band): ± 2%FSO (0 to +85°C) ± 3%FSO (-40 to +125°C)
- Interface: I²C (SPI available upon request)
- Operating Range: 1.7V ~ 3.6V
- Small size package
- Package: 4x4mm QFN
- Fully-calibrated and compensated
- Digital compensation via 26-bit internal digital signal processor (DSP) running a correction algorithm



Amphenol

Sensors



Overview

- The NPB 102 is an absolute pressure sensor with digital output for low cost applications.
- With a standard 4x4 mm QFN package, it is ideally suited for automobile, portable electronics and spaceconstrained applications.
- A wide operating temperature range from -40°C to +125°C fits well with demanding environmental requirements.
- NPB-102 employs a MEMS pressure sensor with a signal-conditioning IC to provide accurate pressure measurement from 26kPa to 200kPa.
- The NPB 102 not only compensates and calibrates the pressure element, but also provides a corrected temperature output using an internal sensor.
- Digital compensation of the signal offset, sensitivity, temperature and non-linearity is accomplished via 26-bit internal digital signal processor (DSP) running a correction algorithm.
- Calibration coefficients are stored on-chip in highly reliable, nonvolatile, multiple-time programmable (MTP) memory.

Specifications

Absolute Maximum Ratings

Sumbol	Deremeter		Limits			
Symbol	Faranteter	Min.	Typical	Max.	Onit	
V _{DD}	Analog Supply Voltage	-0.4	-	3.63	V	
I _{IN}	Input Current except RES &SS	-100	-	100	mA	
P _{ovr}	Overpressure (Pressure element only,non-hermetic package)	-	-	400	kPa	
V _{HBM1}	ESD-HBM		-	-	V	
T _{STOR}	StorageTemperature	-50	-	130	°C	

Operating Conditions

Cumb ol	Parameter			Limits		
Symbol				Typical	Max.	Onit
V_{DD}	Supply Voltage		1.68	-	3.63	V
tv _{DD}	VDD RiseTime		-	-	200	us
t _{sta1}	Start up Time	V _{DD} ramp up to communication	-	-	1	ms
t _{sta2}	Start up Time	V _{DD} ramp up to operation	-	-	2.5	ms
t _{wup1}		Sleep to Active communication	-	-	0.5	ms
t _{wup2}	wake up Time	Sleep to Active operation	-	-	2	ms
	Current Concurrentian	Active State	-	1050	1500	uA
VDD	Current Consumption	Sleep Mode ≤125°C	-	50	750	nA
	Onerating Pressure Penge	NPB-102X-0126A	26	-	126	kPa
Γ _{OPR}	P _{OPR} Operating Pressure Range	NPB-102X-0200A	50	-	200	kPa
T _{OPR}	Operating Temperature Range		-40	-	125	°C
	Media Compatibility:	Dry air (Non-condensing, 0% to 90% Relative Humidity) Compatible with exposed materials-thermosetplastic, epoxy and silicone				

Specifications (cont.)

Performance Specifications

Unless otherwise specified: 3.3VDC Supply Voltage, Room Temperature

Question	Devenetor		Lin	Netes		
Symbol	Parameter	Min	Typical	Max	Unit	notes
t _{RES}	Response Time	-	3.7	-	ms	270Hz update rate
D	P _{TEB} Pressure Accuracy (Total Error Band)	-2.0	-	+2.0	%FSO	0~85°C
r _{teb}		-3.0	-	+3.0	%FSO	-40~0°C & 85~125°C
Τ _{ΕΒ}	Temperature Accuracy	-	±4	-	°C	-40~125°C
f _{c,I2C}	I ² C Clock Frequency	-	-	3.4	MHz	
f _{c,spi}	SPI Clock Frequency	-	1	10	MHz	
f _{c,I2C}	I ² C Slave Address	-	0x27	-	Hex	
P _{BIT} /T _{BIT}	Output Data Bits	-	-	24	bit	

I²C Commands

The I^2C read command supported by the NPB-102 are listed in the table below. The command to read an address in the user memory is the same as its address.

Command (Byte)	Return	Description
AA _{HEX}	24-bit formatted fully corrected sensor measurement data + 24-bit corrected temperature data	Measure Triggers full measurement cycle and calculation and storage of data in interface (configurations from MTP)

General Status Byte

Bit	7	6	5	4	3	2	1	0
Meaning	0	Powered	Busy	Mo	ode	Memory Error	Config Setup	ALU Saturation

Mode Status Byte

Status [4:3]	00	01	10	11
Mode	Normal Mode	Command Mode	Reserved	Command Mode and Reserved

Calculating Pressure & Temperature Output

Pressure [kPa] = $1.25 \times (P_{max} - P_{min}) \times (P_{count} \div 16777216 - 0.1) + P_{min}$ Temperature [C] = $169 \times (T_{count} \div 16777216) - 41$

Package Information



- 1. Dimensions in mm.
- 2. Footprint is only a recommendation, subject to test by the customer.
- 3. Stencil design and volume of solder used is the responsibility of the user.











	Common								
Symbol	Dimensions mm			Dimensions in.					
	Min.	Nom.	Max.	Min.	Nom.	Max.			
А			2.0			0.079			
A3		0.203 Ref			0.008 Ref				
A4		1.40 Ref			0.055 Ref				
A5		0.35 Ref			1.014 Ref				
b	0.25	0.30	0.35	0.010	0.012	0.014			
D	3.90	4.00	4.10	0.154	0.157	0.161			
D2	1.50	1.60	1.70	0.059	0.063	0.067			
Е	3.90	4.00	4.10	0.154	0.157	0.161			
E2	1.50	1.60	1.70	0.059	0.063	0.067			
е		0.65 BSC		0.026 BSC					
L	0.45	0.55	0.65	0.018	0.022	0.026			
К	0.60	0.650	0.07	0.024	0.026	0.003			
k1	0.85	0.95	1.05	0.033	0.037	0.041			
k2	0.85	0.95	1.05	0.033	0.037	0.041			
k3	0.18	-	0.28	0.007	-	0.011			
k4	0.10	-	0.15	0.004	-	0.006			
Т	0.05	0.10	0.15	0.002	0.004	0.006			
T2	0.15	0.20	0.25	0.006	0.008	0.010			
Т3	0.05	0.15	0.25	0.002	0.006	0.010			

Pin Description



Pin No.	Name	Description
1	VDD	Ground
2	RES	Reset
3	EOC	End of conversion
4	MISO	Data output for SPI
5 ~ 8	-	Not connected
9	SCL/SCLK	Clock for I ² C/SPI
10	SDA/MISO	Data for I ² C/SPI
11	SS	Slave select for SPI
12 ~ 15	-	Not connected
16	VDD	Supply voltage

I²C Communications Interface

I²C

In I²C 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 - I²C Command Request



Figure 2 - I²C Read Status

Read Data (I²C Read)

(a) Example: after the completion of a Memory Read command



(b) Example: after the completion of a Measure command (AAHEX)





All mandatory l²C-bus protocol features are implemented. Optional features like clock stretching, 10-bit slave address, etc., are not supported by the sensor's interface.

In I²C-High Speed Mode, a command consists of a fixed length of three bytes.

Ordering Information



Part Number	Description
NPB-102I-0126A	26-126kPa, I ² C output
NPB-102I-0200A	50-200kPa, I ² C output

Amphenol Sensors

www.amphenol-sensors.com

© 2025 Amphenol Corporation. All Rights Reserved. Specifications are subject to change without notice. Other company names and product names used in this document are the registered trademarks or trademarks of their respective owners.