CPS171

Consensic

Data Sheet

Manifold Absolute Pressure Sensor

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Consensic

Overview

The CPS171 is a resistive absolute pressure sensor solution with a fully calibrated pressure compensated analog output for low pressure applications, such as MAP (Manifold Absolute Pressure) systems.

The CPS171 solution comprises of an ultra-small resistive MEMS pressure sensor and a conditioning ASIC for accurate pressure measurements in factory calibrated ranges for the MAP applications. An integrated sigma-delta based ADC combined with internal calibration logic provides a high level analog output signal that is proportional to the applied pressure.

Applications

- Manifold Absolute Pressure
- Industrial Equipment
- Air Control Systems
- Vacuum Systems

Benefits

- Low Power Consumption
- External Clock not Required
- High Resistance to Sensing Media

Features

- Factory Calibrated Pressure Sensor
- Supply Voltage: 5.0V ±10%
- Operating Temperature Range: -40°C to +85°C
- Pressure Accuracy: <±0.8kPa (<±8.0mbar) @ 25°C

Interfaces

- Analog Output: Typical 10% to 90% of V_{SUPPLY}

Physical Characteristics

- Small Form Factor, 3 x 5 x 1.2mm (w x l x h)
- LGA Package, 8 Lead
- Top Side Sensing Port

RoHS Compliant

FIGURE 1: CPS171 ANALOG OUTPUT CIRCUIT

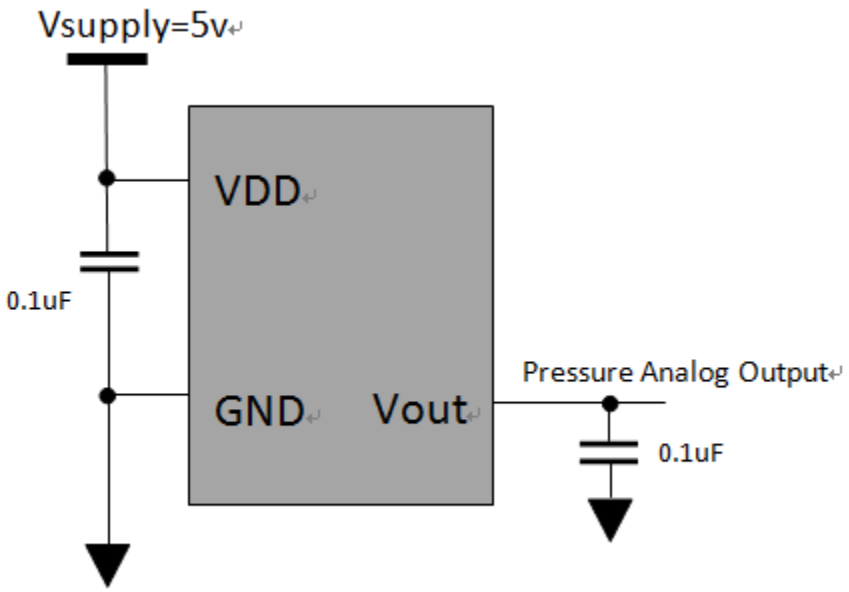

TABLE1: ORDERING INFORMATION

PART NUMBER	PRESSURE RANGE	OUTPUT	PACKAGE
CPS171	10 to 115kPa	Analog	8-Lead LGA, Metal Lid, PCB Substrate

SALES and CONTACT INFORMATION sales@consensic.com
www.consensic.com

United States
Consensic, Inc.
1900 Powell Street,Suite 600
Emeryville California,
94608, USA
Ph: +1 510.588.8735

China
Wuxi Consensic Electronics Co., Ltd.
100 Dicui Road
530 Building B, Suite 704
Wuxi, Jiangsu Province, 214072
Ph: +86 510.85122279
Fax: +86 510.85122259

无锡康森斯克电子科技有限公司
无锡市滨湖区滴翠
路 100 号 530 大厦 B 栋 704
邮编 214072
電話: +86 510.85122279
传真: +86 510.85122259

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1 OPERATING CHARACTERISTICS

1.1 ABSOLUTE RATINGS

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
Over Pressure					1000 (10)	kPa (bar)
Supply Voltage (with respect to GND)	V_{DD}		-0.3		6.0	V
Voltages at Analog I/O – In Pin	V_{INA}		-0.3		V_{DD} +0.3	V
Voltages at Analog I/O – Out Pin	V_{OUTA}		-0.3		V_{DD} +0.3	V
Storage Temperature	T_{STOR}		-50		130	°C

1.2 OPERATING CONDITIONS

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
OPERATION						
Supply Voltage to GND[1]	V_S		4.75	5.0	5.25	V
Operating Temperature Range			-40		85	°C
PRESSURE RANGE 1 CHARACTERISTICS (CPS171-JW001)						
Range 1			10 (100)	—	115 (1150)	kPa (mbar)
Full Scale Output	V_{FSO}	@V_S=5.0V	—	4.7	—	V
Full Scale Span	V_{FSS}	@V_S=5.0V	—	4.5	—	V
Accuracy		(0 to 85°C)	—	—	±1.5	%V_{FSS}
Sensitivity	V/P		—	45	—	mV/kPa

1.3 ELECTRICAL PARAMETERS

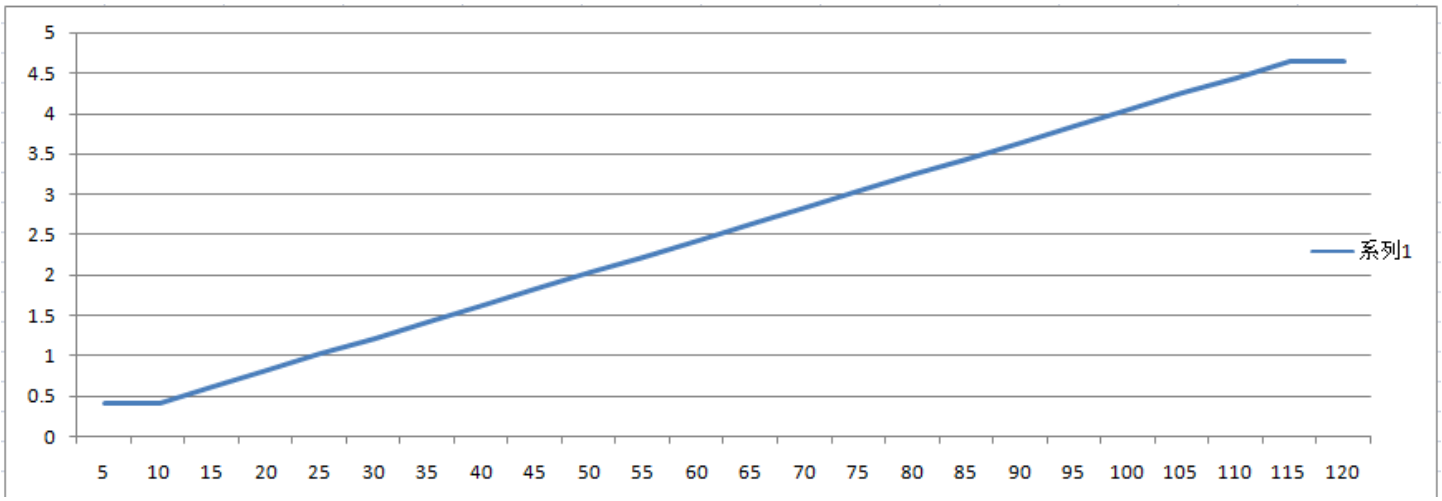
PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
SUPPLY CURRENT						
Update Mode Current	I_{DD}	Worst Case Settings: 12-bit, 0ms Power Down		1200	1500	µA
ANALOG OUTPUT						
CPS171	Analog_P	10 to 115kPa (100 to 1150mbar)	0.4		4.65	V
Analog OUTPUT						
Resolution	RES			12		Bits
Analog Additional Error (Including Ratiometricity Error)	Eout	-40 to 125°C		0.1	0.5	%
SYSTEM						
Trimmed System Frequency	f_{SYS}	All Timing in this Specification are Subject to this Variation		1.85		MHz
Start-Up-Time Power-On to Data Ready	t_{STA}	Fastest and Slowest Settings	4.25		173	ms
Update Rate (Normal Mode)	T_{RESP_UP}	Fastest and Slowest Settings	0.70		288	ms
Peak-to-Peak Noise @ Output (100 Measurements in 12-bit)	N_{OUT}			5		LSB

2 OUTPUT MODES

2.1 ANALOG OUTPUT

The CPS171 provides a ratio metric analog output to applied pressure.

FIGURE 2: EXAMPLE OF ANALOG OUTPUT VS. PRESSURE



3 OPERATION MODE

The CPS171 is factory programmed in Update Mode only. Measurements are taken continuously.

4 OTP ROM

The OTP ROM array contains the sensor calibration coefficients and the configuration bits for the analog front end, output modes, measurement modes, etc.

5 CALCULATING OUTPUT

The pressure output is a linear transfer function between measured pressure and the input voltage.

5.1 PRESSURE OUTPUT

5.1.1 Pressure Output Transfer Function

Pressure (kPa) = (Vout / 0.040476) + 0.117647

6 PACKAGE AND ASSEMBLY

The CPS171 is available in a small land grid array (LGA) package with a metal lid. There is a hole on the lid to allow for external pressure to the sensing diaphragm.

6.1 PIN LAYOUT

FIGURE 3: CPS171 PACKAGE PIN LAYOUT

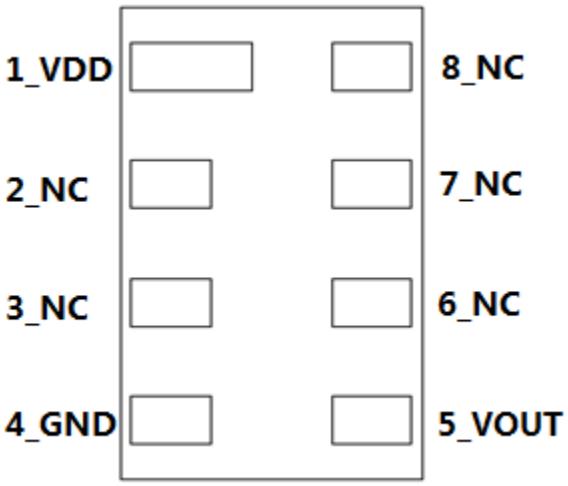


TABLE 2: CPS171 PIN DESCRIPTION

Pin	Name	Type	Function
1	VDD	P	Connect 0.1uF CAP to GND
2	NC	--	--
3	NC	--	--
4	GND	G	Ground
5	VOUT	O	Voltage output
6	NC	--	Factory use only
7	NC	--	Factory use only
8	NC	--	--

6.2 MECHANICAL DRAWING

FIGURE 4: LGA WITH METAL LID PACKAGE

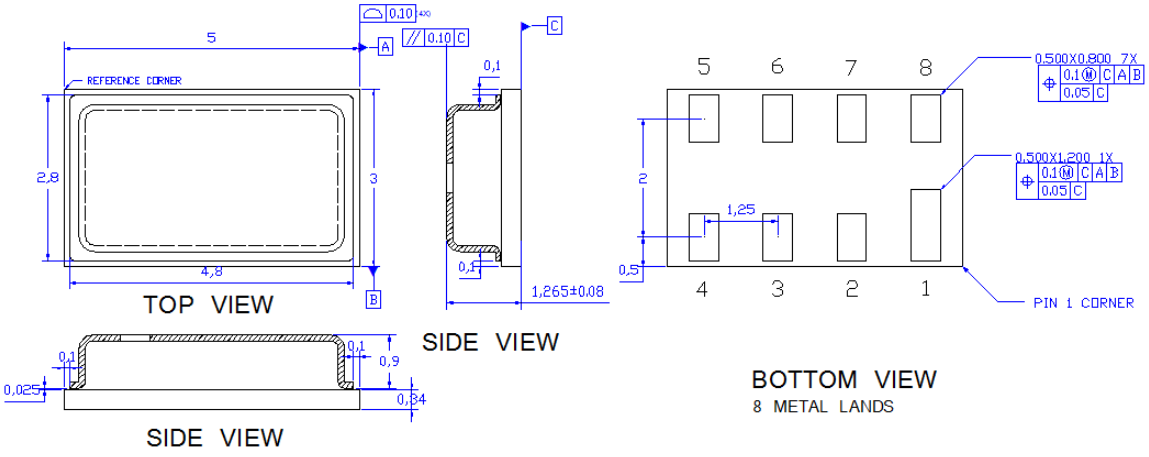


TABLE 3: MECHANICAL DIMENSIONS

DIMENSION	MIN.	TYP.	MAX.	UNITS
Length		5		mm
Width		3		mm
Height		1.265		mm
Pad 1 Length		0.5		mm
Pad 1 Width		1.2		mm
Pad 2 to 8 Length		0.5		mm
Pad 2 to 8 Width		0.8		mm
Pad Pitch(Y-Axis)		2		mm
Pad Pitch(X-Axis)		1.25		mm
Port Hole Diameter		0.5		mm

6.3 SOLDERING CONDITIONS

TABLE 4: PACKAGE REFLOW TEMPERATURE

PARAMETER	CONDITIONS	MIN	TYP	MAX	UNITS
Soldering Peak Temperature	Less than 30 seconds (JEDEC-STD-020 Standard)			260	°C

7 DOCUMENT HISTORY

REVISION	DATE	DESCRIPTION
0.0	12-July-2018	Preliminary Release

8 DISCLAIMER

Information in this datasheet is provided solely to enable implementation and use of Consensic products. The specifications and characteristics are subject to change without notice. Consensic reserves the right to make changes without further notice to any products herein.

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