CPS171

Consensic

Data Sheet

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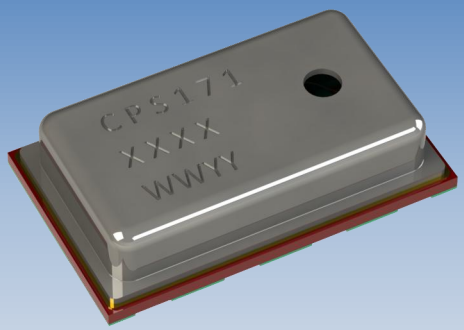
Manifold Absolute Pressure Sensor



CPS171

Manifold Absolute Pressure Sensor

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

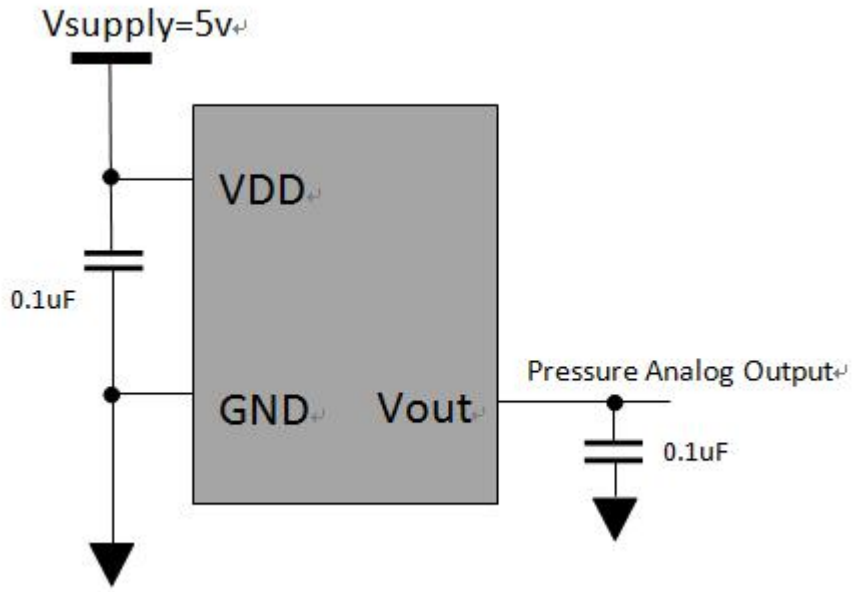


TABLE1: ORDERING INFORMATION

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

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CONTENTS

LIST OF TABLES

LIST OF FIGURES

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

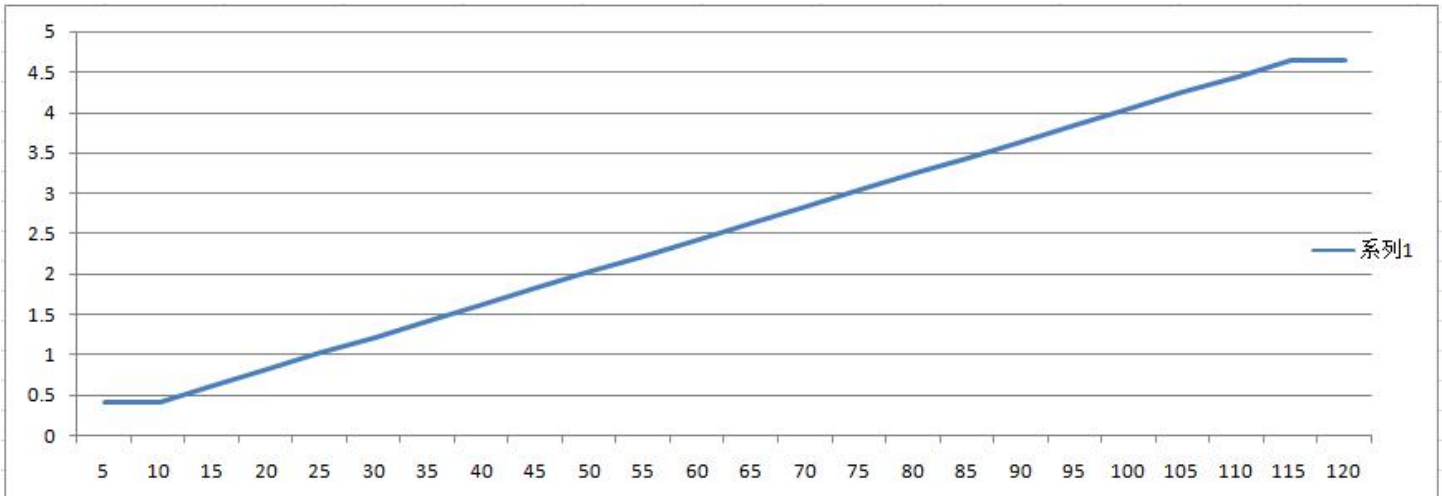
PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
SUPPLY CURRENT						
Update Mode Current	I_{DD}	Worst Case Settings: 12-bit, 0ms Power Down		1200	1500	µA
ANALOG OUTPUT						
CPS171	Analog_P	10 to 115kPa (100 to 1150mbar)	0.4		4.65	V
Analog OUTPUT						
Resolution	RES			12		Bits
Analog Additional Error (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

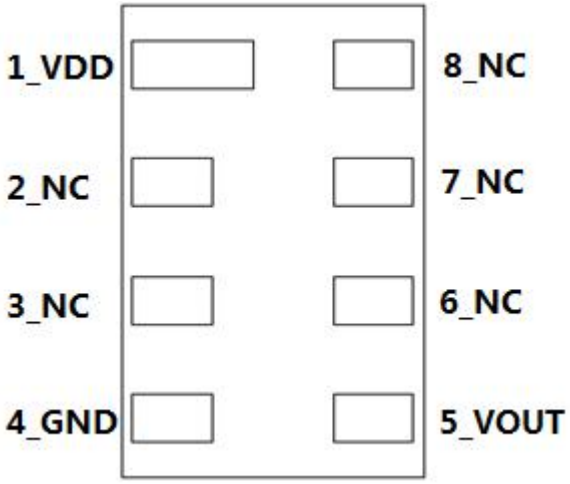


TABLE 2: CPS171 PIN DESCRIPTION

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

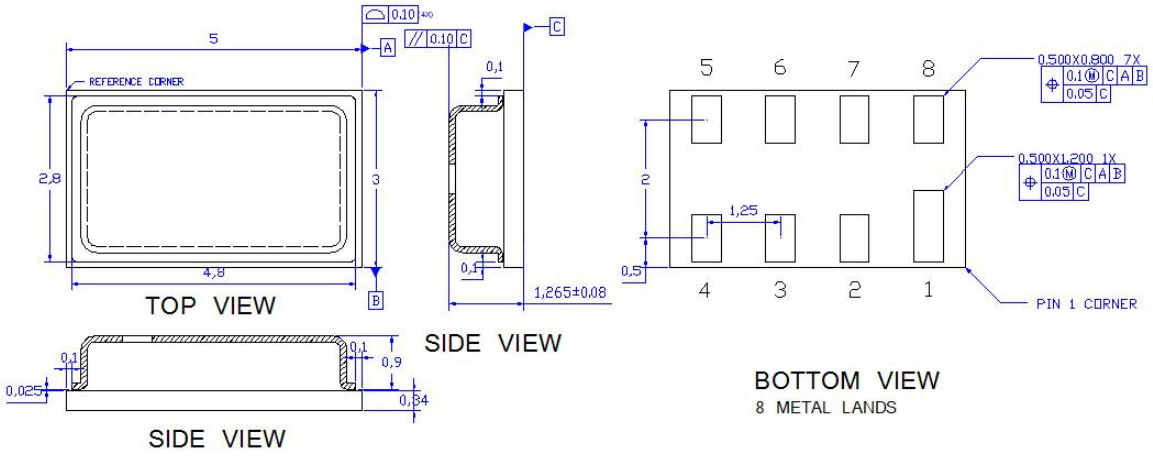


TABLE 3: MECHANICAL DIMENSIONS

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-Jul-2018	Preliminary Release
0.1	01-Mar-2021	Modify company address

8 DISCLAIMER

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