![Fujikura]

Messrs.

SPECIFICATION

Semiconductor Pressure Sensor

Model: AG30F-250KA

Project:

Distributor:

Reference:

S. Mitani

Shogo Mitani, Application Engineer
Sensor Business Unit
Electronics Business Company

Fujikura Ltd.

Table of Contents

Table shown below is revision records of this specification

Est.	22 January, 2019	S. Mitani		
	Date	Name	Comment	Mark

1. General

This document describes the specifications of Fujikura Pressure Sensors, Type of AG30F-250KA.

2. Principle

Fujikura Pressure Sensor is composed of a silicon piezoresistive pressure sensing chip and a signal conditioning integrated circuit. The low-level signal from the sensing chip is amplified, temperature compensated, calibrated, and finally converted to a high-level output signal that is proportional to the applied pressure.

3. Device lineup

This device has the following lineup.

Model	Pressure Type	Supply Voltage	Accuracy	Pressure Range			
				0 20			250 kPa(abs.)
AG3	Absolute	5.0 Vdc	±0.9 %FS				

Features

- ✓ Amplified and temperature compensated smooth analog output
- ✓ Low profile flat package
- ✓ Compatible with the XFAM integrated pressure sensors
- ✓ Customization or modification available
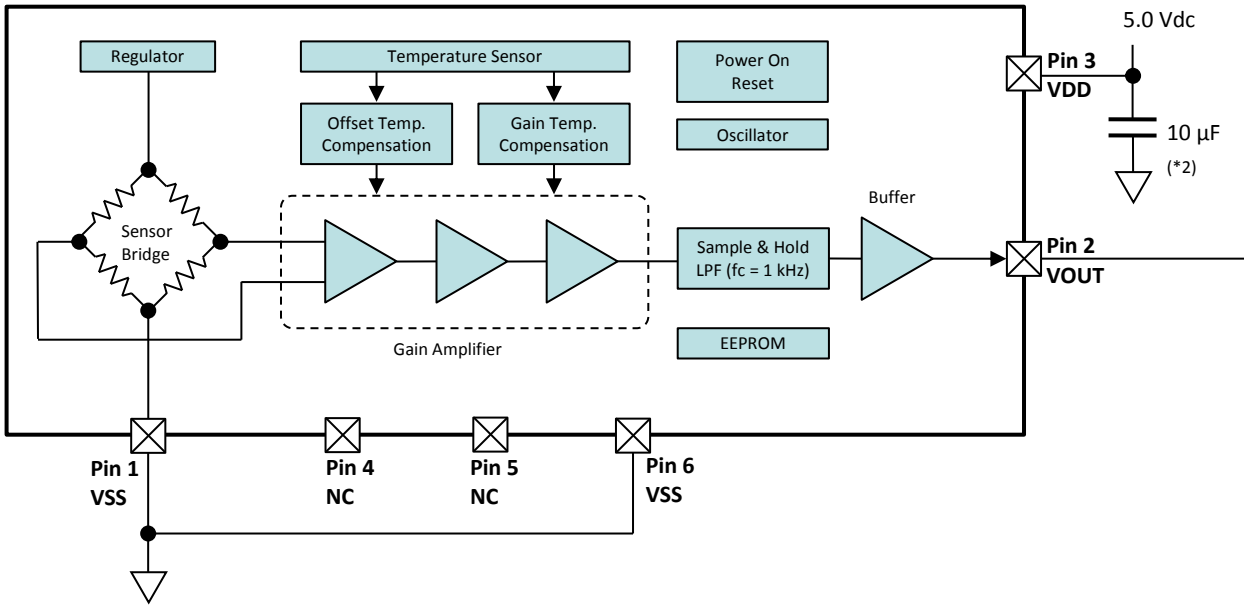
Applications

- ✓ Medical devices
- ✓ Industrial pneumatic devices
- ✓ Consumer devices

4. RoHS

This device is compliant with the Restriction of the use of certain Hazardous Substances in Electrical and Electronic Equipment (RoHS).

5. Block Diagram and Pin Connections

Pin Assignment	Pin No.	Pin Name	I/O	Type	Function	
	1	VSS	-	-	Common voltage connection	*1
	2	VOUT	O	Analog	Analog output	
	3	VDD	-	-	Power supply connection	*2
	4	NC	-	-	Non-connection	*3
	5	NC	-	-	Non-connection	*3
	6	VSS	-	-	Common voltage connection	*1

Notes:
*1)   Both Pin 1 and Pin 6 must be connected to VSS.
*2)   Put a 1.0 µF capacitor as minimum between Pin3 (VDD) and VSS. **If VOUT is susceptible to noise, it would be recommended to increase capacitance.**
*3)   Pin assignment of Pin 4 and 5 is NC (Non connection).

6. Drop-in Replacement

XFAM-250KPASR

AG30F-250KA

7. Device Name Code

The device name code is consisted of Sensor code, Pressure code, Custom ID and Packing style. For the exact ordering device number, please refer to Chapter 17 Ordering Information.

Sensor Code			Pressure Code				
AG3	**0**	**F**	**-**	**250K**	**A**	**-**	

	Blank: Tray
Packing	**TP:** Tape & Reel
Pressure type	**A**: Absolute pressure
Pressure value	**250K:** 250 kPa
Package	**F**: Flat package
Supply voltage	**0:** 5.0 Vdc
Model	**AG3:** SMD / Smooth analog output

8. Absolute Maximum Ratings

Item	Symbol	Rating			Unit
		Min.	Typ.	Max.	
Load Pressure	Pmax+	-	-	+375	kPa(abs.)
Supply Voltage	VDDmax	-	-	6	Vdc
Operating Temperature	Topt	-40	-	+105	°C
Storage Temperature	Tstg	-40	-	+105	°C

Note:

*1) Absolute maximum ratings are the limits that the device will withstand without damage.

9. General Specifications

Item	Condition		Symbol	Rating			Unit	
				Min.	Typ.	Max.		
Supply Voltage	Sensor Code	AG30F	VDD	4.75	5.0	5.25	Vdc	*1
Type of Pressure			-		Absolute pressure			*2
Pressure Media			-		Non-corrosive gases			*3
Pressure Range			Popt	20	-	250	kPa(abs.)	*4
Compensated Temperature			-	+10	-	+40	°C	*5
Operating Humidity	Non-condensing		Hopt	30	-	85	%RH	*6
Storage Humidity	Non-condensing		Hstg	30	-	85	%RH	*6
Dielectric Strength			-	-	-	1	mA	*7
Insulation Resistance			-	100	-	-	MΩ	*8

Notes:

*1) Output voltage (Vout) is not perfectly ratio-metric with the power supply voltage (VDD).

*2) Absolute pressure is defined as the difference between applied pressure to the device and absolute zero pressure.

*3) Ensure the pressure media contains no particulates. The device is not compatible with liquids.

*4) Pressure range is defined as the measurable pressure range of the device. Do not expose intentionally beyond minimum Popt and maximum Popt.

*5) Please also refer to Chapter 12 Transfer Function.

*6) Do not wet the device with dew.

*7) Dielectric strength is defined as the leakage current between all pins and the package with AC 500, 1 minute.

*8) Insulation resistance is defined as the resistance value between all pins and the package with DC 500 V.

10. Electrical Characteristics

Load resistor RL = ∞, Ambient temperature Ta = 25°C

Item	Condition	Symbol	Rating			Unit	
			Min.	Typ.	Max.		
Sensor Code: AG30F (VDD = 5.0 Vdc)							
Offset Voltage	Min. Popt	Voff	0.16	0.2	0.24	V	*1, 2
Full Scale Voltage	Max. Popt	Vfs	4.66	4.7	4.74	V	*3
Span Voltage	Min. to max. Popt	SV	-	4.5	-	V	*4
Accuracy	+10 to +40°C	Error	-2.07	-	+2.07	kPa	*5, 6
			-0.9	-	+0.9	%FS	
			-0.04	-	+0.04	V	
Supply Current		Ic	-	-	6	mAdc	*7
Response Time	for reference	tr	-	1	-	msec.	*8
Load Resistor	VOUT to VSS or VDD to VOUT	RL	9.5	-	-	kΩ	*7
Load Capacitance	VOUT to VSS	CL	-	-	50	pF	*9

Notes:

*1) Offset voltage (Voff) is defined as the output voltage at minimum Popt.

*2) Offset error is calibration error of offset voltage at production. It does not include Long term offset drift. It would be suggested that applications have Auto-zeroing function.

*3) Full scale voltage (Vfs) is defined as the output voltage at maximum Popt.

*4) Output span voltage (SV) is defined as the voltage difference between Offset voltage (Voff) and Full scale voltage (Vfs).

*5) Accuracy consists of the following:
>   Non-linearity
>   Temperature errors over the temperature range 10 to 40°C
>   Pressure hysteresis
>   Calibration errors of sensitivity and offset

*6) The unit of Accuracy "%FS" is defined as a percent error by Span voltage (SV).

*7) Supply Current (Ic) is increased depending on the value of Load resistor (RL).

*8) Response time (tr) is defined as the time for the change in output voltage from 10% to 90% or from 90% to 10% of its final value when the input pressure makes a step change.
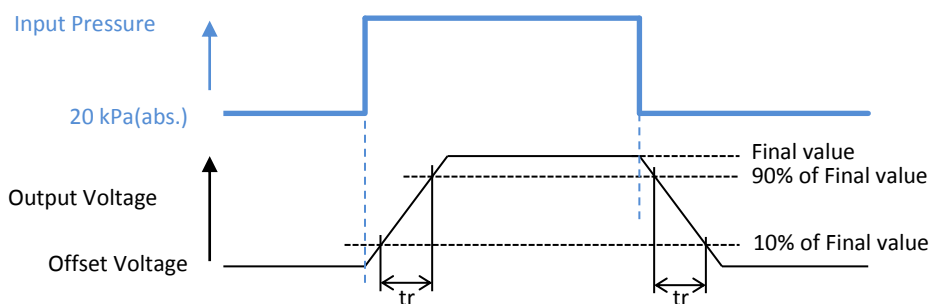
*9) Do not put Load capacitance (CL) that is over 50 pF between VOUT and VSS.

11. Output Voltage versus Input Pressure

Sensor Code
AG30F

VDD = 5.0 Vdc, Temp. = +10 to +40°C

Output

Vfs: 4.7 V

Error: ±0.04 V

SV: 4.5 V

Voff: 0.2 V

Min. Popt: Max. Popt

Input Pressure
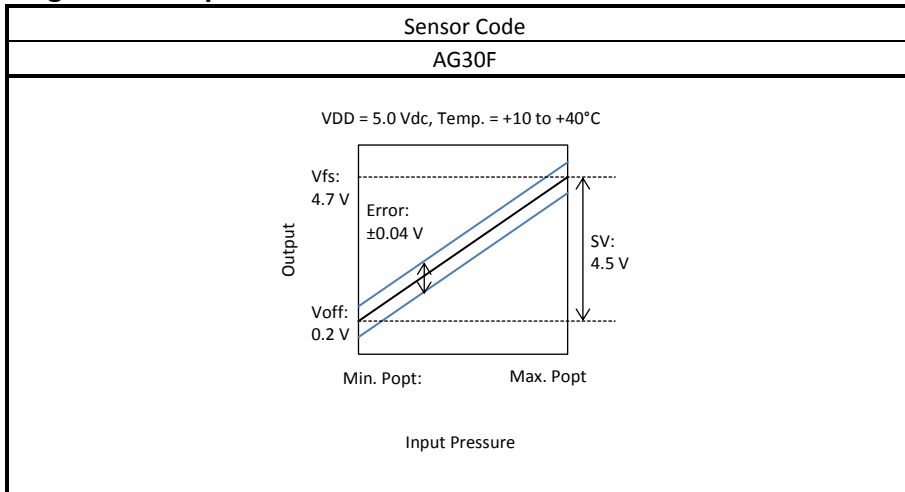
12. Transfer Function

Item	Rating
Transfer Function	$V_{out} (V) = VDD \times ((P \times \alpha) + \beta) \pm (\text{Pressure Error} \times \text{Temperature Error Multiplier} \times \alpha \times VDD)$ $$P (kPa(abs.)) = \frac{\dfrac{V_{out} \pm (\text{Pressure Error} \times \text{Temperature Error Multiplier} \times \alpha \times VDD)}{VDD} - \beta}{\alpha}$$

Parameters	Sensor Code	VDD (*1)	P	α	β	Pressure Error
	AG30F	5.0±0.25 V	20 to 250 kPa(abs.)	9/2300	-22/575	2.07 kPa(abs.)

Temperature Error Multiplier	

Error Multiplier vs Temperature (°C)

5
4
3
2
1
0

-40   -20   0   20   40   60   80   100

Temperature (°C)

Note:
*1)   Output voltage (Vout) is not perfectly ratio-metric with the power supply voltage (VDD).

13. Operating Sequence
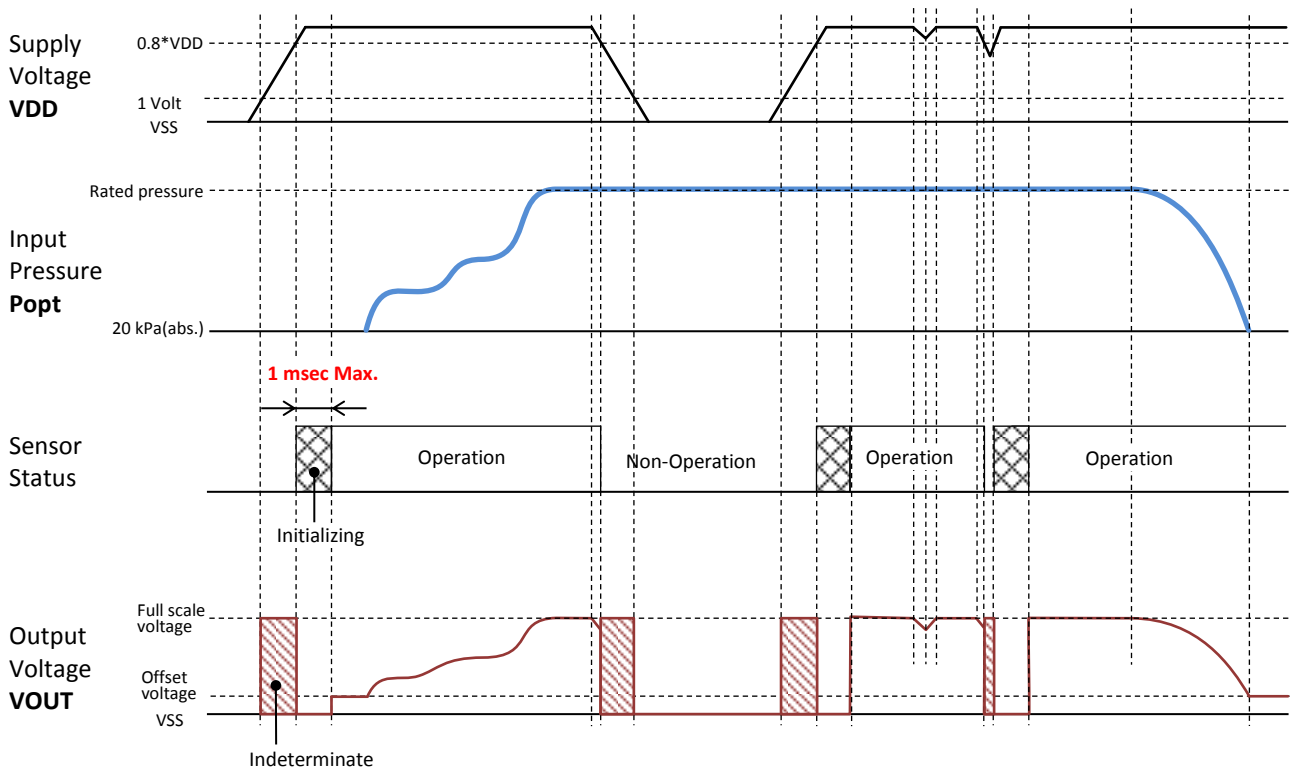
Notes:
*1) The status of VOUT is indeterminate when supply voltage is under 0.8*VDD.
*2) Initializing process is started when supply voltage reaches 0.8*VDD,. At initializing process, VOUT is fixed 0.1*VDD and under.

14. Device Marking

Items			Marking					
		Production Lot						
	Y	Last digit of Production year	0 to 9					
	M	Production month	Jan	Feb	Mar	Apr	May	Jun
			1	2	3	4	5	6
			Jul	Aug	Sep	Oct	Nov	Dec
			7	8	9	X	Y	Z
	DD	Production date	01 to 31					
		Sensor Code						
		AG30F	AG30					
		Pressure Code	250A					

Note:
*1) Package code is not marked on the face plate.

15. Soldering

Process	Sensor Code	Condition	
Reflow soldering	AG30F	**Soldering Profile**	*1 *2 *3 *4

	A	Ramp up	2 to 4 °C / sec.
	B	Pre-heating	150 to 180 °C 60 to 120 sec.
	C	Ramp up	2 to 4 °C / sec.
	D	Heating	Above 230 °C, 45 sec. max. 245 °C max., 10 sec. max.
	E	Ramp down	2 to 4 °C / sec.

Notes:
*1) NEVER wash the device with any washing liquid. NEVER wash the device with any ultrasonic washing machine.
*2) Do not put the solder and flux on the device's package.
*3) Temperature means the surface temperature of the device's package.
*4) Do not reflow more than twice.

16. Dimensions and Weights

Refer to the following drawing as attached.

Sensor Code	Dimension Drawing	Weights
AG30F	9-772-019	approx. 0.3 grams

17. Ordering Information

Supply Voltage	Ordering Device Number	Packing	Qty./Packing	
5.0 Vdc	AG30F-250KA	Tray	100	Pcs/Tray
	AG30F-250KA-TP	Tape & Reel	1000	Pcs/Reel

18. Tape & Reel Information
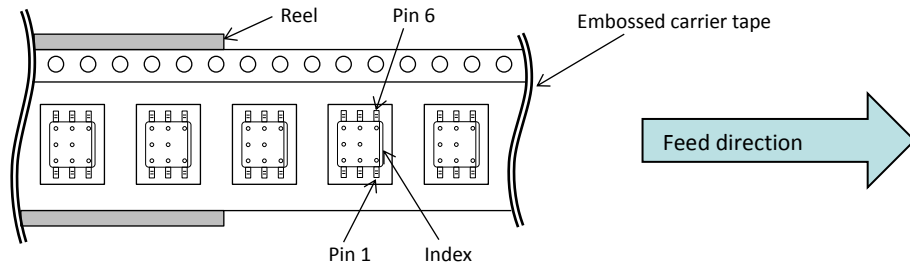
19. Footprint for PCB (for Reference)

Sensor Code	Footprint
AG30F	

Notes:
*1) These footprints are for reference. Please evaluate well these footprints, before your mass production.
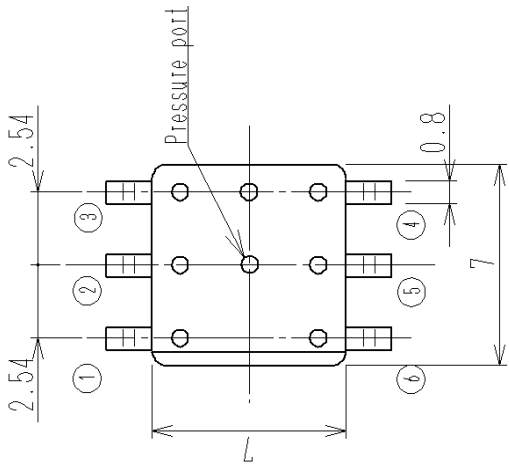*2) When designing your PCB, please also refer to the outline diagrams.

20. Handling Notes

Plating of pins is silver (Ag). Silver has physical property that is discolored to black or brown by sulfur. There are notes for handling as below:
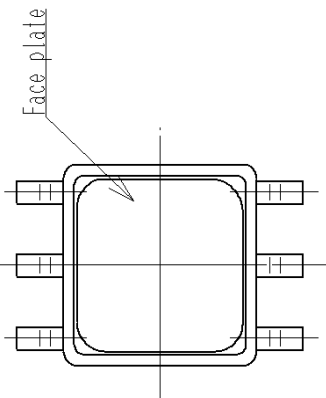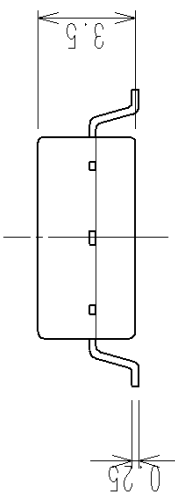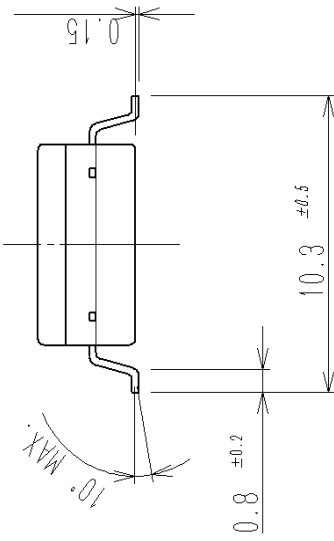
· To prevent discoloration of pins, please keep the devices sealed in static shielding bags before soldering.
· Need to carefully check the solderability for discolored pins.
· After soldering, pins would be discolored in black or brown in atmosphere. However it does not impact reliability of the device.

21. Notes

· Fujikura reserves all rights.
· This document is subject to change without notice.
· Limitation, usage, environment, standard warranty and so on are listed on Fujikura web site.
· Please refer to the latest specifications.

AGxxF Series
Outline Diagram

Pressure port

Face plate

Index

3.5

0.25

2.54

2.54

0.8

7

L

10.3 ±0.5

0.15

0.8 ±0.2

10° MAX.

① ② ③ ④ ⑤ ⑥