

Structure Silicon Monolithic Integrated Circuit

Product Name Capacitive Sensor Switch Control IC

Product No. **BU21051FS**

Features  
2ch sensor input.  
2ch parallel output  
No software control is necessary  
Internal (CR) oscillation, integrated power-on reset  
Operating power supply voltage: 4.5 ~ 5.5V

○Absolute Maximum Ratings (Ta=25[°C])

Parameter	Symbol	Rating	Unit	Notes
Applied voltage	AVDD	-0.3~7.0	V	
	DVDD	-0.3~7.0	V	
Input voltage	V <sub>AIN</sub>	-0.3~AVDD + 0.3	V	
	V <sub>DIN</sub>	-0.3~DVDD + 0.3	V	
Storage temperature range	T <sub>stg</sub>	-55~125	°C	
Power dissipation <sup>(*)</sup>	P <sub>d</sub>	650	mW	

(\*1) This is the power dissipation per IC unit. Reduce to 6.5 mW /°C when Ta = 25°C or above.

○Operating condition (Ta=25[°C])

Parameter	Symbol	Rating			Unit	Notes
		Min.	Typ.	Max.		
Applied voltage	AVDD*	4.5	5.0	5.5	V	
	DVDD*	4.5	5.0	5.5	V	
Operating temperature range	T <sub>opr</sub>	-40	25	85	°C	

\*Applied voltage AVDD = DVDD.

This chip is not designed to protect itself against radioactive rays.

Status of this document

The Japanese version of this document is the formal specification. A customer may use this translation version only for a reference to help reading the formal version. If there are any differences in translation version of this document, formal version takes priority.

Application example

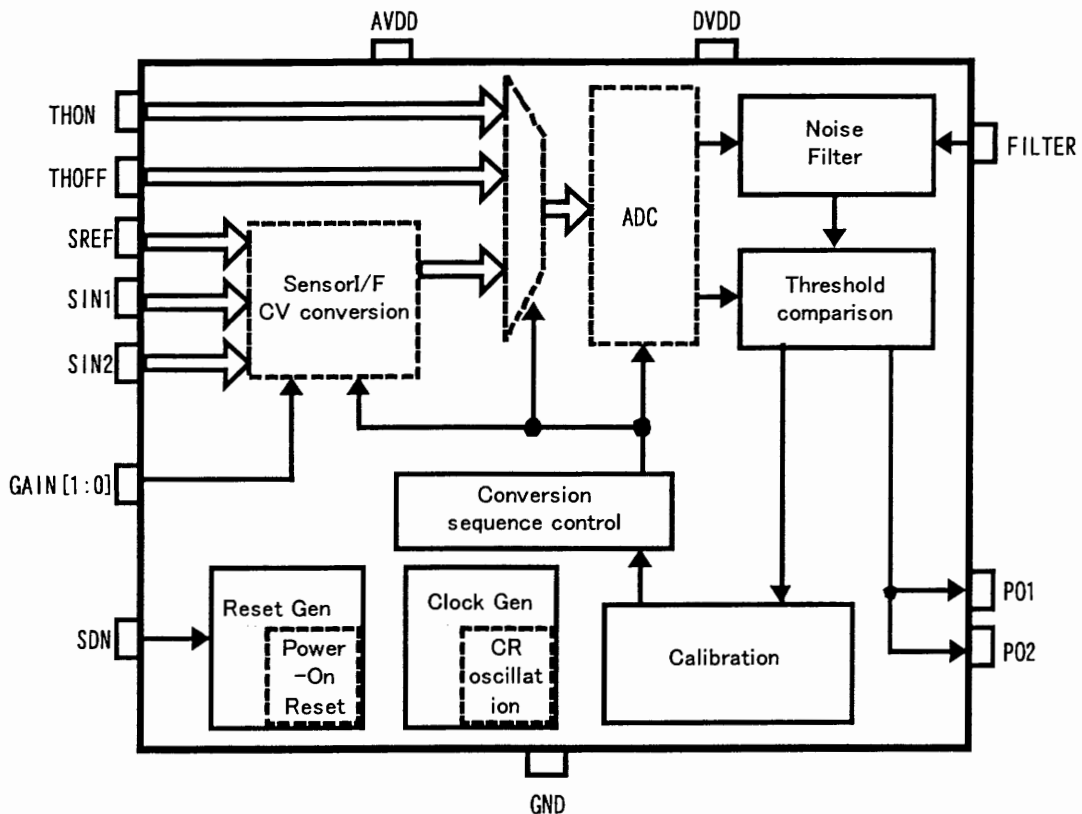
- ROHM cannot provide adequate confirmation of patents.
- The product described in this specification is designed to be used with ordinary electronic equipment or devices (such as audio-visual equipment, office-automation equipment, communications devices, electrical appliances, and electronic toys). Should you intend to use this product with equipment or devices which require an extremely high level of reliability and the malfunction of which would directly endanger human life (such as medical instruments, transportation equipment, aerospace machinery, nuclear-reactor controllers, fuel controllers and other safety devices), please be sure to consult with our sales representative in advance.
- ROHM assumes no responsibility for use of any circuits described herein, conveys no license under any patent or other right, and makes no representations that the circuits are free from patent infringement.

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			REV. A	<b>ROHM CO., LTD.</b>

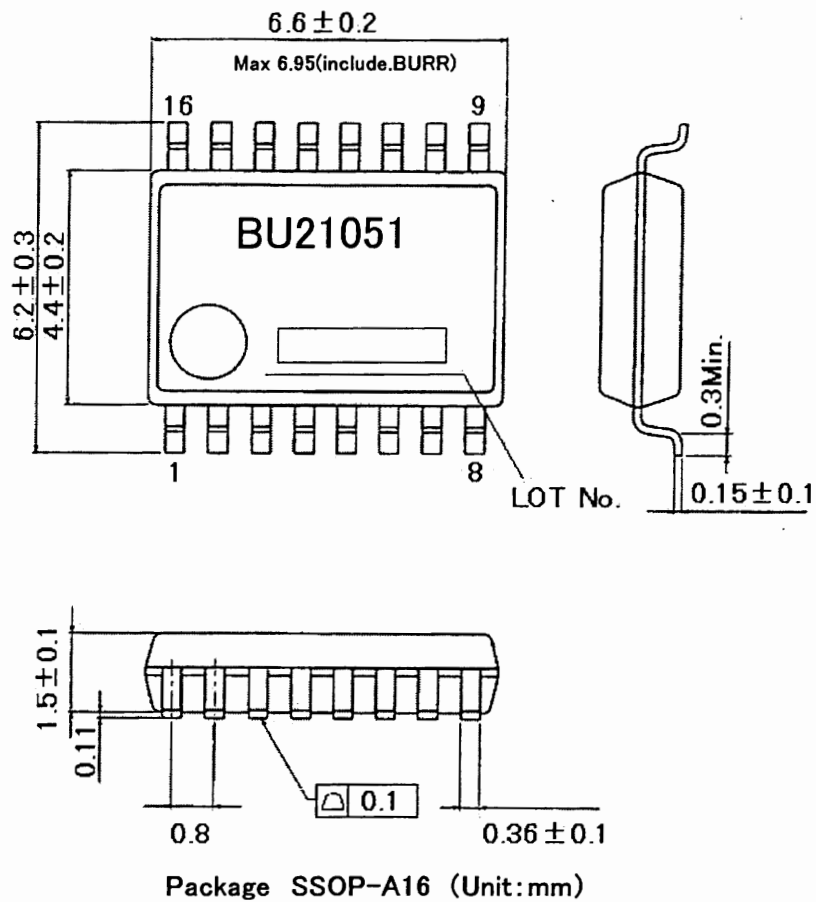
○Electrical characteristics (Unless otherwise noted  $T_{opr} = 25[^\circ\text{C}]$ ,  $AVDD = DVDD = 5[V]$ ,  $GND=0[V]$ )

Parameter	Symbol	Rating			Unit	Notes
		Min.	Typ.	Max.		
DC characteristic						
H input voltage	$V_{IHIO}$	$DVDD \times 0.9$	-	$DVDD + 0.2$	V	
L input voltage	$V_{ILIO}$	$GND - 0.2$	-	$DVDD \times 0.1$	V	
L output voltage	$V_{OL}$	GND	-	$DVDD \times 0.2$	V	$I_{OL} = 2[mA]$ undershoot is excluded
Input leakage current	$I_{IZ}$	-1	-	1	$\mu A$	
Off leakage current	$I_{OZ}$	-1	-	1	$\mu A$	
Standby current	$I_{ST}$	-	-	2	$\mu A$	Shutdown on (SDN = 'L')
Operation current	$I_{OD}$	-	550	-	$\mu A$	

○Block diagram



○External measure and View



○Pin description

Pin No.	Pin Name	Function
1	DVDD	Digital part power supply
2	GND	Ground
3	SREF	Sensor standard capacity
4	SIN1	Sensor input 1
5	N.C.	Non connect
6	SIN2	Sensor input 2
7	THON	Sensor ON Threshold voltage
8	THOFF	Sensor OFF Threshold voltage
9	AVDD	Analog part power supply
10	TST	Digital part test pins
11	SDN	Shutdown
12	PO2	Sensor output 2
13	PO1	Sensor output 1
14	FILTER	Filter effect selection
15	GAIN[0]	Gain level selection
16	GAIN[1]	Gain level selection

**○Cautions on use****(1) Absolute Maximum Ratings**

An excess in the absolute maximum ratings, such as supply voltage, temperature range of operating conditions, etc., can break down devices, thus making impossible to identify breaking mode such as a short circuit or an open circuit. If any special mode exceeding the absolute maximum ratings is assumed, consideration should be given to take physical safety measures including the use of fuses, etc.

**(2) Operating conditions**

These conditions represent a range within which characteristics can be provided approximately as expected. The electrical characteristics are guaranteed under the conditions of each parameter.

**(3) Reverse connection of power supply connector**

The reverse connection of power supply connector can break down ICs. Take protective measures against the breakdown due to the reverse connection, such as mounting an external diode between the power supply and the IC's power supply terminal.

**(4) Power supply line**

Design PCB pattern to provide low impedance for the wiring between the power supply and the GND lines. In this regard, for the digital block power supply and the analog block power supply, even though these power supplies has the same level of potential, separate the power supply pattern for the digital block from that for the analog block, thus suppressing the diffraction of digital noises to the analog block power supply resulting from impedance common to the wiring patterns. For the GND line, give consideration to design the patterns in a similar manner.

Furthermore, for all power supply terminals to ICs, mount a capacitor between the power supply and the GND terminal. At the same time, in order to use an electrolytic capacitor, thoroughly check to be sure the characteristics of the capacitor to be used present no problem including the occurrence of capacity dropout at a low temperature, thus determining the constant.

**(5) GND voltage**

Make setting of the potential of the GND terminal so that it will be maintained at the minimum in any operating state. Furthermore, check to be sure no terminals are at a potential lower than the GND voltage including an actual electric transient.

**(6) Short circuit between terminals and erroneous mounting**

In order to mount ICs on a set PCB, pay thorough attention to the direction and offset of the ICs. Erroneous mounting can break down the ICs. Furthermore, if a short circuit occurs due to foreign matters entering between terminals or between the terminal and the power supply or the GND terminal, the ICs can break down.

**(7) Operation in strong electromagnetic field**

Be noted that using ICs in the strong electromagnetic field can malfunction them.

**(8) Inspection with set PCB**

On the inspection with the set PCB, if a capacitor is connected to a low-impedance IC terminal, the IC can suffer stress. Therefore, be sure to discharge from the set PCB by each process. Furthermore, in order to mount or dismount the set PCB to/from the jig for the inspection process, be sure to turn OFF the power supply and then mount the set PCB to the jig. After the completion of the inspection, be sure to turn OFF the power supply and then dismount it from the jig. In addition, for protection against static electricity, establish a ground for the assembly process and pay thorough attention to the transportation and the storage of the set PCB.

**(9) Input terminals**

In terms of the construction of IC, parasitic elements are inevitably formed in relation to potential. The operation of the parasitic element can cause interference with circuit operation, thus resulting in a malfunction and then breakdown of the input terminal. Therefore, pay thorough attention not to handle the input terminals, such as to apply to the input terminals a voltage lower than the GND respectively, so that any parasitic element will operate. Furthermore, do not apply a voltage to the input terminals when no power supply voltage is applied to the IC. In addition, even if the power supply voltage is applied, apply to the input terminals a voltage lower than the power supply voltage or within the guaranteed value of electrical characteristics.

**(10) Ground wiring pattern**

If small-signal GND and large-current GND are provided, it will be recommended to separate the large-current GND pattern from the small-signal GND pattern and establish a single ground at the reference point of the set PCB so that resistance to the wiring pattern and voltage fluctuations due to a large current will cause no fluctuations in voltages of the small-signal GND. Pay attention not to cause fluctuations in the GND wiring pattern of external parts as well.

**(11) External capacitor**

In order to use a ceramic capacitor as the external capacitor, determine the constant with consideration given to a degradation in the nominal capacitance due to DC bias and changes in the capacitance due to temperature, etc.

**(12) Rush current**

The IC with some power supplies has a capable of rush current due to procedure and delay at power-on. Pay attention to the capacitance of the coupling condensers and the wiring pattern width and routing of the power supply and the GND lines.

**(13) Others**

In case of use this LSI, please peruse some other detail documents, we called, Technical note, Functional description, Application note.