General-purpose CMOS Logic IC Series (BU4S,BU4000B Series)

Single Gate CMOS Logic ICs <Analog Switch>

BU4S66G2

No. 09050JAT02

●Description

The BU4S66G2 is a 1ch analog switch IC encapsulated in an SSOP5 package, and can replace 1 circuit of the general-purpose CMOS two-way analog switch BU4066B IC.

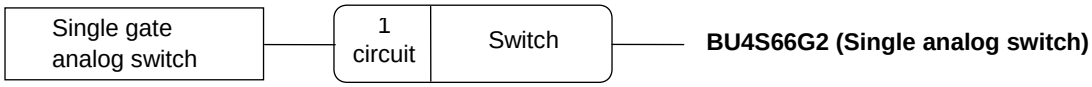
●Features

1) Low power consumption
2) Surface mount package (SSOP5)
3) Broad operating supply voltage range: 3V-16V
4) L-TTL2 and LS-TTL1 inputs can be driven directly
5) Function compatible with BU4066BC series (1ch).
6) Excellent linearity

●Applications

Can be used as a digital/analog switch, ON/OFF switch, or changeover switch in a high speed line, with no deterioration of the analog signals. Connection to a low impedance circuit is possible, due to the low ON resistance.

●Lineup



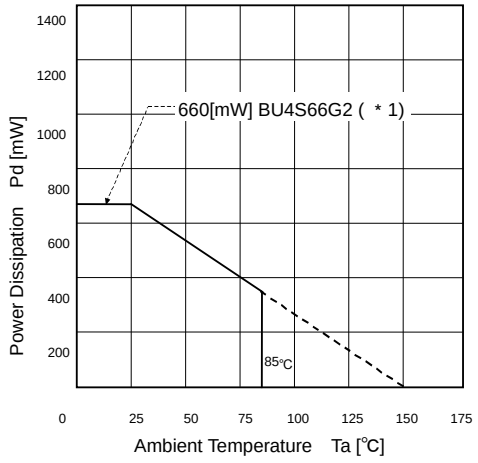
●Absolute Maximum Ratings

Parameter	Symbol	Limit	Unit
Power Supply Voltage	VDD	-0.3 to 18	V
Supply Current	Iin	±10	mA
Operating Temperature	Topr	-40 to 85	℃
Storage Temperature	Tstg	-55 to 150	℃
Input Voltage	VIN	-0.3 to VDD+0.3	V
Maximum Junction Temperature	Tjmax	150	℃

●Recommended Operating Conditions

Parameter	Symbol	Limit	Unit
Operating Power Supply	VDD	3 to 16	V
Input Voltage	VIN	0 to VDD	V

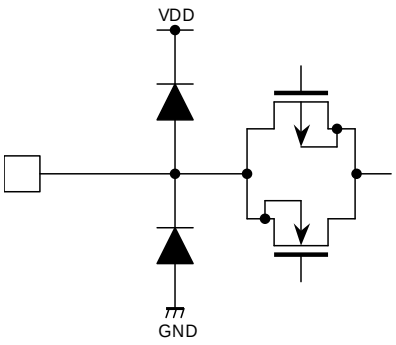
●Thermal Derating Curve



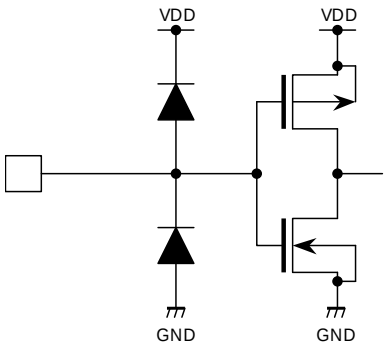
(*1)	Unit
5.3	mW/℃

Reduced per 1C at Ta>25℃. Power Dissipation measured when sample mounted on a 70mm×70mm×1.6mm FR4 glass-epoxy PCB (copper area less than 3%)

●Input / Output Equivalent Circuits



<Analog Switch Input/Output>



<Control Input>

●Electrical Characteristics (BU4S66G2)

DC Characteristics (Unless otherwise noted : VSS=0[V],Ta=25[℃])

Parameter	Symbol	Limits			Unit	VDD[V]	Condition	Fig.No
		Min	Typ	Max				
Control “H”input voltage	VIH	3.5	—	—	V	5	Current between in and out=10[μA]	—
		7.0	—	—		10		
		11.0	—	—		15		
Control “L”input voltage	VIL	—	—	1.5	V	5	Current between in and out =10[μA]	—
		—	—	3.0		10		
		—	—	4.0		15		
ON resistance	RON	—	290	950	Ω	5	0≦VIN≦VDD RL=10[kΩ]	1
		—	120	250		10		
		—	85	160		15		
Channel-OFF Leakage current	LOFF	—	—	0.3	μA	15	VIN=15[V],VOUT=0[V]	—
		—	—	-0.3		15	VIN=0[V],VOUT=15[V]	
Static supply current	IDD	—	—	1.0	μA	5	VIN=VDD or GND	—
		—	—	2.0		10		
		—	—	4.0		15		
Input capacitance(control input)	CC	—	8	—	pF	—	f=1[MHz]	—
Input capacitance(switch input)	CS	—	10	—	pF	—	f=1[MHz]	—

Switching Characteristics (Unless otherwise noted : VSS=0[V],Ta=25[℃],CL=50[pF])

Parameter	Symbol	Limits			Unit	VDD[V]	Condition	Fig.No
		Min	Typ	Max				
Propagation delay time (I/O→O/I)	tPLH	—	15	—	ns	5	RL=10[kΩ] CL=50[pF]	2
		—	8	—		10		
		—	5	—		15		
	tPHL	—	15	—	ns	5	RL=10[kΩ] CL=50[pF]	3
		—	8	—		10		
		—	5	—		15		
Propagation delay time (CONTROL→O/I)	tPHZ	—	100	—	ns	5	RL=10[kΩ] CL=50pF	4
		—	70	—		10		
		—	65	—		15		
	tPLZ	—	100	—	ns	5	RL=10[kΩ] CL=50[pF]	5
		—	70	—		10		
		—	65	—		15		
	tPZH	—	80	—	ns	5	RL=10[kΩ] CL=50[pF]	6
		—	35	—		10		
		—	25	—		15		
	tPZL	—	80	—	ns	5	RL=10[kΩ] CL=50[pF]	7
		—	35	—		10		
		—	25	—		15		
Maximum control frequency	fmax (C)	—	10	—	MHz	5	RL=1[kΩ] CL=50[pF]	—
		—	12	—		10		
		—	12	—		15		
Maximum propagation frequency	Fmax (I-O)*1	—	30	—	MHz	5	VSS=-5[V],RL=1[kΩ] CL=50[pF]	—
Feedthrough attenuation	FT*2	—	600	—	kHz	5	VSS=-5[V],RL=1[kΩ]	—
Sine wave distortion (1[kHz])	THD*3	—	0.05	—	%	5	VSS=-5[V],RL=10[kΩ] CL=50[pF]	—
Cross talk (CONTROL→O/I)	CTc	—	200	—	mV	5	RIN=1[kΩ] ROUT=10[kΩ] CL=15[pF]	—
		—	400	—	mV	10		
		—	600	—	mV	15		

*1 Frequency where 20log(VOUT/VIN)=3[dB]
*2 Frequency where 20log(VOUT/VIN)=50[dB]
*1 *2 *3 Must be sine wave of VIN±2.5[Vp-p].

●Electrical Characteristics Curves

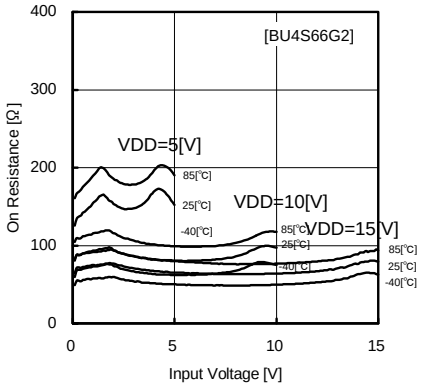


Fig.1 Output current－voltage

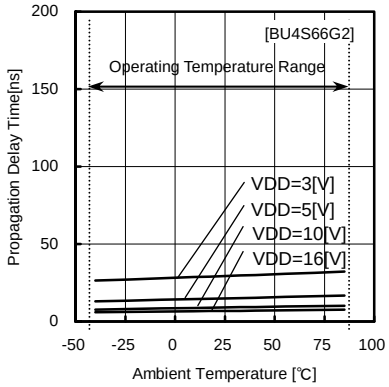


Fig.2 Propagation delay tPLH (IN-OUT)

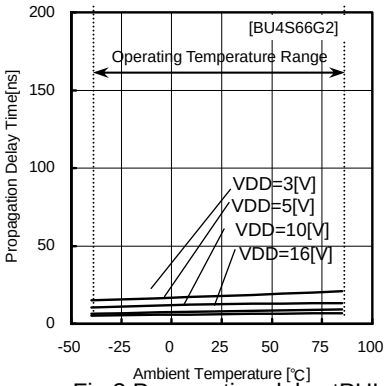


Fig.3 Propagation delay tPHL (IN-OUT)

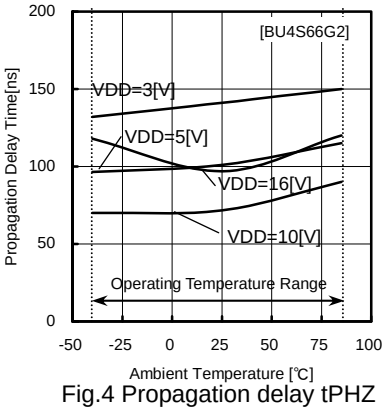


Fig.4 Propagation delay tPHZ (CONT-OUT)

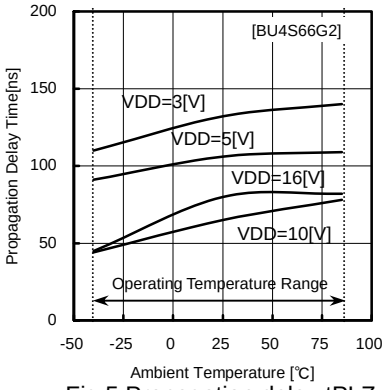


Fig.5 Propagation delay tPLZ (CONT-OUT)

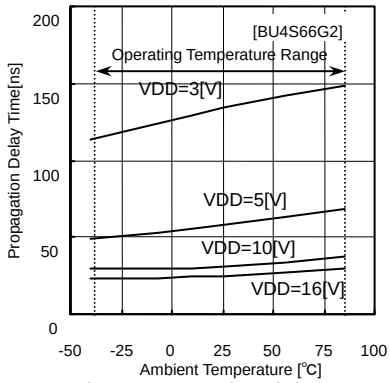


Fig.6 Propagation delay tPZH (CONT-OUT)

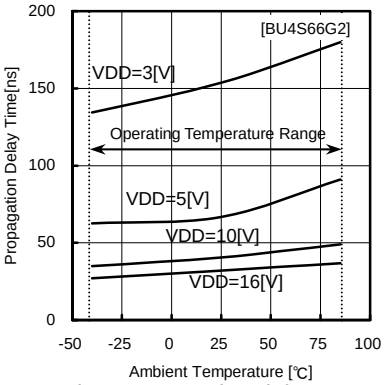
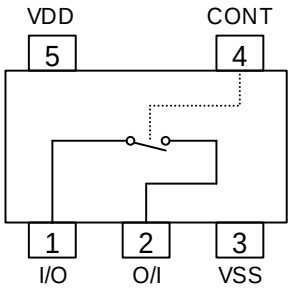


Fig.7 Propagation delay tPZL (CONT-OUT)

●Pinout Diagram・Pin Description・Input / Output Table

Pinout Diagram



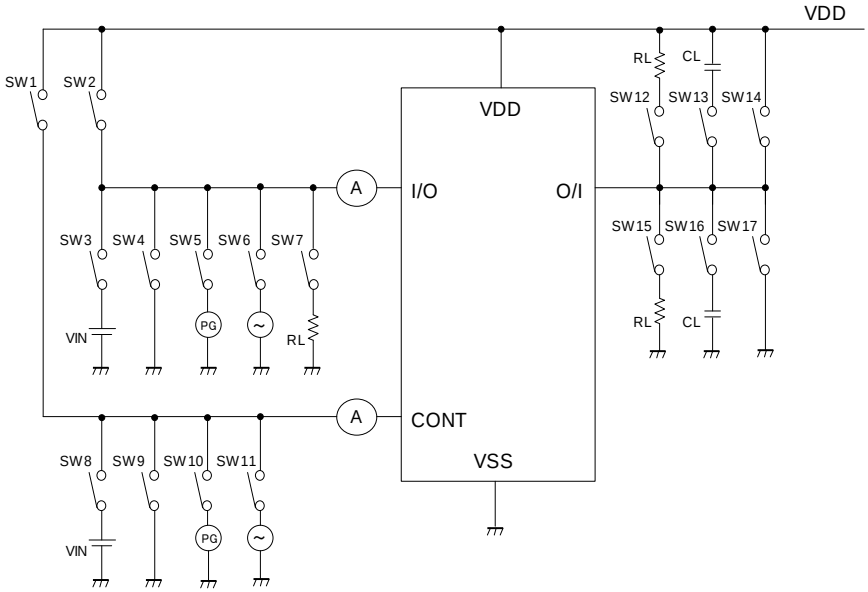
Input / Output Table

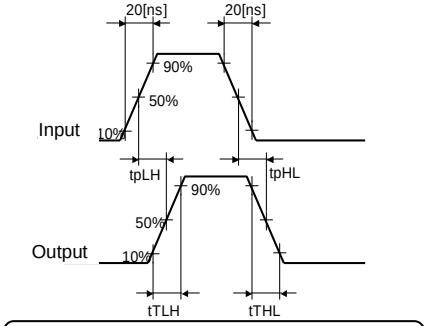
CONT	SW
L	OFF
H	ON

Pin Description

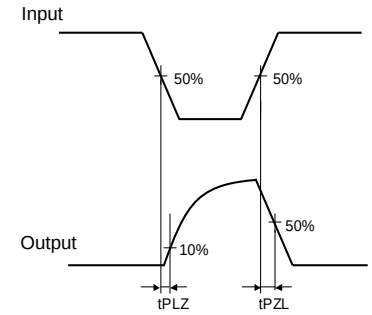
Pin No	Symbol	I/O	Function
1	I/O	I/O	Analog Switch Input / Output
2	O/I	I/O	Analog Switch Input / Output
3	VSS	—	Power supply(-)
4	CONT	I	Control Input
5	VDD	—	Power supply(+)

●Measurement Circuit





Switching Characteristics



Propagation delay

●Switching Table

Parameter		SW 1	SW 2	SW 3	SW 4	SW 5	SW 6	SW 7	SW 8	SW 9	SW 10	SW 11	SW 12	SW 13	SW 14	SW 15	SW 16	SW 17
Input voltage/current		OFF	ON	OFF	OFF	OFF	OFF	OFF	ON	OFF	OFF	OFF	OFF	OFF	OFF	ON	OFF	OFF
ON resistance		ON	OFF	ON	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	ON	OFF	OFF
Channel-OFF Leakage current		OFF	ON	OFF	OFF	OFF	OFF	OFF	OFF	ON	OFF	OFF	OFF	OFF	ON	OFF	OFF	ON
		OFF	OFF	OFF	ON	OFF	OFF	OFF	OFF	ON	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
Switching Characteristics		ON	OFF	OFF	OFF	ON	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	ON	ON	OFF
Propagation time CONT→OUT	tPLZ	OFF	OFF	OFF	OFF	ON	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
	tPZL	OFF	ON	OFF	OFF	OFF	OFF	OFF	OFF	OFF	ON	OFF	ON	ON	OFF	ON	ON	OFF
Sine wave distortion Feedthrough attenuation		ON	OFF	OFF	OFF	OFF	ON	OFF	OFF	OFF	ON	OFF	OFF	OFF	OFF	ON	ON	OFF
		OFF	OFF	OFF	OFF	OFF	ON	OFF	OFF	ON	OFF	OFF	OFF	OFF	OFF	ON	ON	OFF
Control		OFF	OFF	OFF	OFF	OFF	OFF	ON	OFF	OFF	OFF	ON	OFF	OFF	OFF	ON	ON	OFF

●Notes for 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 the devices, thus making impossible to identify breaking mode, such as a short circuit or an open circuit. If any over rated values will expect to exceed the absolute maximum ratings, consider adding circuit protection devices, such as fuses.

2. Connecting the power supply connector backward
   Connecting of the power supply in reverse polarity can damage IC. Take precautions when connecting the power supply lines. An external direction diode can be added.

3. Power supply lines
   Design PCB layout pattern to provide low impedance GND and supply lines. To obtain a low noise ground and supply line, separate the ground section and supply lines of the digital and analog blocks. Furthermore, for all power supply terminals to ICs, connect a capacitor between the power supply and the GND terminal. When applying electrolytic capacitors in the circuit, not that capacitance characteristic values are reduced at low temperatures.

4. GND voltage
   The potential of GND pin must be minimum potential in all operating conditions.

5. Thermal design
   Use a thermal design that allows for a sufficient margin in light of the power dissipation (Pd) in actual operating conditions.

6. Inter-pin shorts and mounting errors
   Use caution when positioning the IC for mounting on printed circuit boards. The IC may be damaged if there is any connection error or if pins are shorted together.

7. Actions in strong electromagnetic field
   Use caution when using the IC in the presence of a strong electromagnetic field as doing so may cause the IC to malfunction.

8. Testing on application boards
   When testing the IC on an application board, connecting a capacitor to a pin with low impedance subjects the IC to stress. Always discharge capacitors after each process or step. Always turn the IC's power supply off before connecting it to or removing it from a jig or fixture during the inspection process. Ground the IC during assembly steps as an antistatic measure. Use similar precaution when transporting or storing the IC.

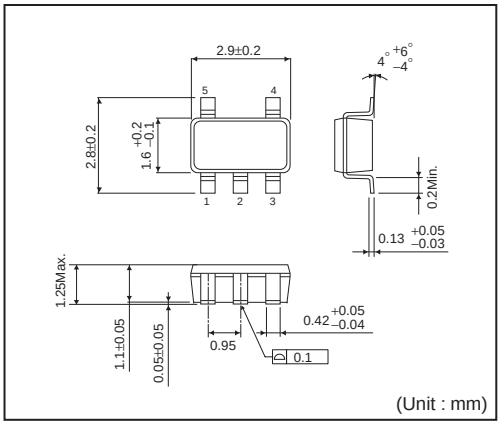
9. Ground Wiring Pattern
   When using both small signal and large current GND patterns, it is recommended to isolate the two ground patterns, placing a single ground point at the ground potential of application so that the pattern wiring resistance and voltage variations caused by large currents do not cause variations in the small signal ground voltage. Be careful not to change the GND wiring pattern of any external components, either.

●Ordering part number

B	U	4	S	6	6	G	2	-	T	R

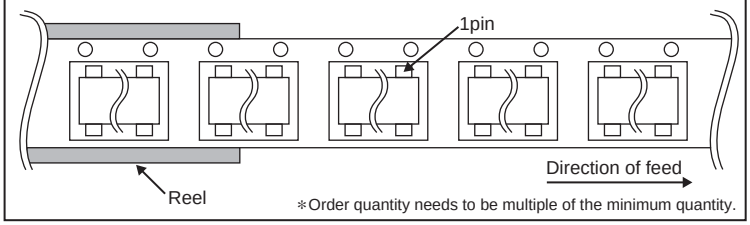
Part No.	Part No. 4S66	Package G2: SSOP5	Packaging and forming specification TR: Embossed tape and reel

SSOP5



<Tape and Reel information>

Tape	Embossed carrier tape
Quantity	3000pcs
Direction of feed	TR (The direction is the 1pin of product is at the upper right when you hold reel on the left hand and you pull out the tape on the right hand)



∗Order quantity needs to be multiple of the minimum quantity.

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JAPAN	USA	EU	CHINA
CLASSⅢ	CLASSⅢ	CLASSⅡb	CLASSⅢ
CLASSⅣ		CLASSⅢ	

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   [a] Use of our Products in any types of liquid, including water, oils, chemicals, and organic solvents
   [b] Use of our Products outdoors or in places where the Products are exposed to direct sunlight or dust
   [c] Use of our Products in places where the Products are exposed to sea wind or corrosive gases, including Cl_2, H_2S, NH_3, SO_2, and NO_2
   [d] Use of our Products in places where the Products are exposed to static electricity or electromagnetic waves
   [e] Use of our Products in proximity to heat-producing components, plastic cords, or other flammable items
   [f] Sealing or coating our Products with resin or other coating materials
   [g] Use of our Products without cleaning residue of flux (even if you use no-clean type fluxes, cleaning residue of flux is recommended); or Washing our Products by using water or water-soluble cleaning agents for cleaning residue after soldering
   [h] Use of the Products in places subject to dew condensation

4. The Products are not subject to radiation-proof design.

5. Please verify and confirm characteristics of the final or mounted products in using the Products.

6. In particular, if a transient load (a large amount of load applied in a short period of time, such as pulse. is applied, confirmation of performance characteristics after on-board mounting is strongly recommended. Avoid applying power exceeding normal rated power; exceeding the power rating under steady-state loading condition may negatively affect product performance and reliability.

7. De-rate Power Dissipation (Pd) depending on Ambient temperature (Ta). When used in sealed area, confirm the actual ambient temperature.

8. Confirm that operation temperature is within the specified range described in the product specification.

9. ROHM shall not be in any way responsible or liable for failure induced under deviant condition from what is defined in this document.

Precaution for Mounting / Circuit board design

1. When a highly active halogenous (chlorine, bromine, etc.) flux is used, the residue of flux may negatively affect product performance and reliability.

2. In principle, the reflow soldering method must be used; if flow soldering method is preferred, please consult with the ROHM representative in advance.

For details, please refer to ROHM Mounting specification

Precautions Regarding Application Examples and External Circuits

1. If change is made to the constant of an external circuit, please allow a sufficient margin considering variations of the characteristics of the Products and external components, including transient characteristics, as well as static characteristics.

2. You agree that application notes, reference designs, and associated data and information contained in this document are presented only as guidance for Products use. Therefore, in case you use such information, you are solely responsible for it and you must exercise your own independent verification and judgment in the use of such information contained in this document. ROHM shall not be in any way responsible or liable for any damages, expenses or losses incurred by you or third parties arising from the use of such information.

Precaution for Electrostatic

This Product is electrostatic sensitive product, which may be damaged due to electrostatic discharge. Please take proper caution in your manufacturing process and storage so that voltage exceeding the Products maximum rating will not be applied to Products. Please take special care under dry condition (e.g. Grounding of human body / equipment / solder iron, isolation from charged objects, setting of Ionizer, friction prevention and temperature / humidity control).

Precaution for Storage / Transportation

1. Product performance and soldered connections may deteriorate if the Products are stored in the places where:
   [a] the Products are exposed to sea winds or corrosive gases, including Cl2, H2S, NH3, SO2, and NO2
   [b] the temperature or humidity exceeds those recommended by ROHM
   [c] the Products are exposed to direct sunshine or condensation
   [d] the Products are exposed to high Electrostatic

2. Even under ROHM recommended storage condition, solderability of products out of recommended storage time period may be degraded. It is strongly recommended to confirm solderability before using Products of which storage time is exceeding the recommended storage time period.

3. Store / transport cartons in the correct direction, which is indicated on a carton with a symbol. Otherwise bent leads may occur due to excessive stress applied when dropping of a carton.

4. Use Products within the specified time after opening a humidity barrier bag. Baking is required before using Products of which storage time is exceeding the recommended storage time period.

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QR code printed on ROHM Products label is for ROHM's internal use only.

Precaution for Disposition

When disposing Products please dispose them properly using an authorized industry waste company.

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