General-purpose CMOS Logic IC Series (BU4S Series)

Single Gate CMOS Logic ICs <Analog Switch>

BU4S66G2

●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

Single gate analog switch	1 circuit	Switch	BU4S66G2 (Single analog switch)

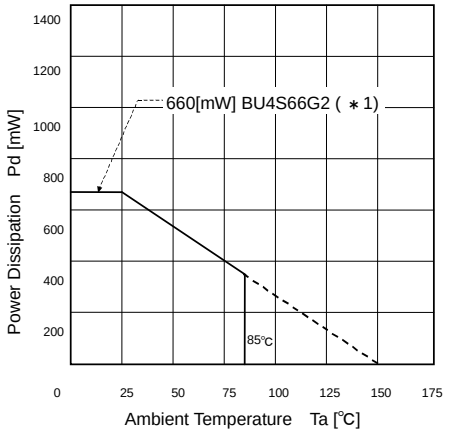
●Absolute Maximum Ratings

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

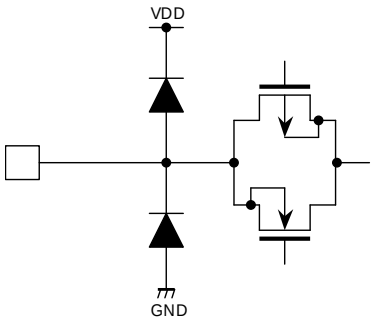
●Thermal Derating Curve



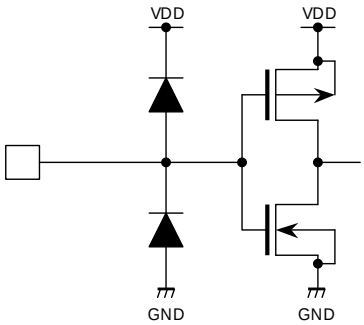
(＊1)	Unit
5.3	mW/℃

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

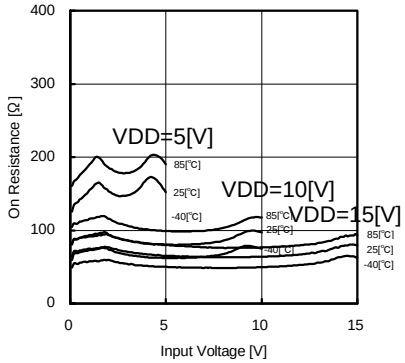


Fig.1 Output current－voltage

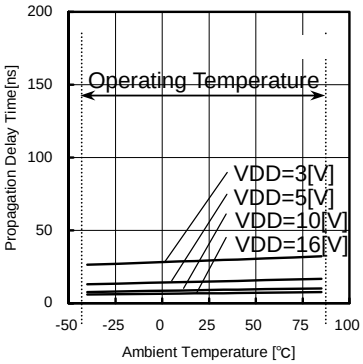


Fig. 2 Propagation delay tPLH
(IN-OUT)

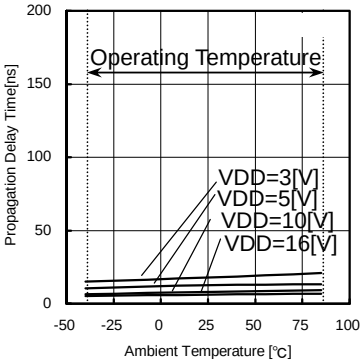


Fig.3 Propagation delay tPHL
(IN-OUT)

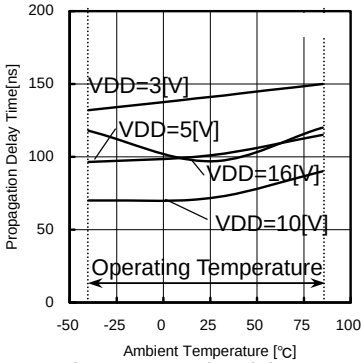


Fig.4 Propagation delay tPHZ
(CONT-OUT)

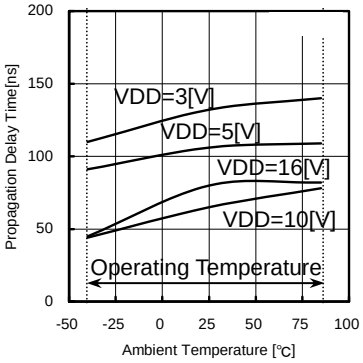


Fig.5 Propagation delay tPLZ
(CONT-OUT)

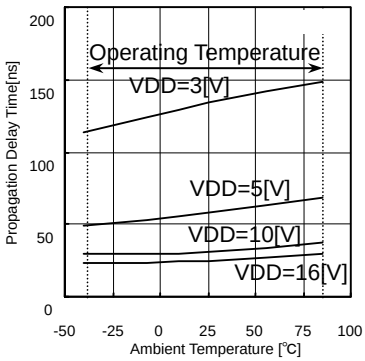


Fig.6 Propagation delay tPZH
(CONT-OUT)

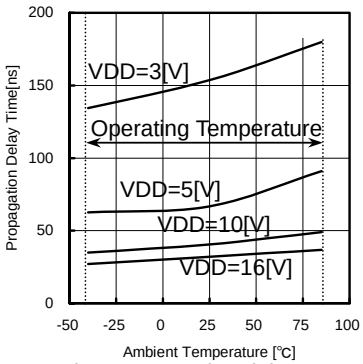
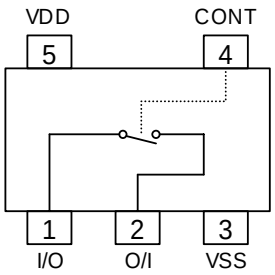


Fig.7 Propagation delay tPZL
(CONT-OUT)

●Pinout Diagram・Pin Description・Input / Output Table

Pinout Diagram



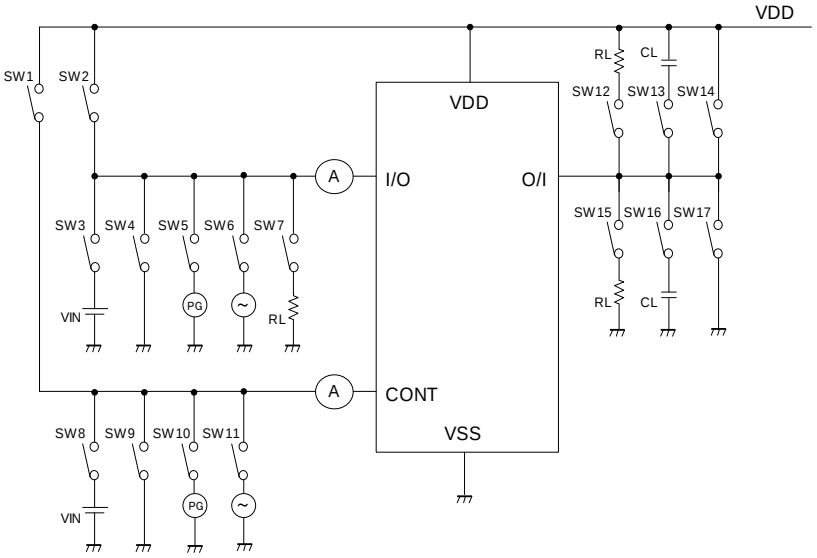
Input / Output Table

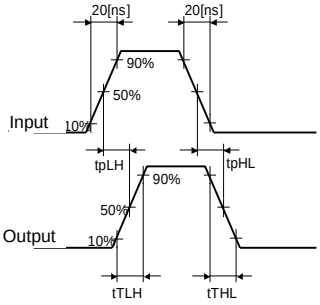
CONT	SW
L	OFF
H	ON

Pin Description

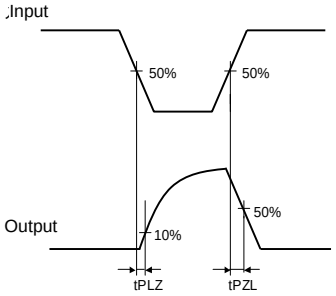
Pin No	Symbol	I/O	Function
1	I/O	I/O	Analog Switch Input / Output
2	O/I	I/O	Analog Switch Input / Output
3	VSS	—	Power supply(-)
4	CONT	I	Control Input
5	VDD	—	Power supply(+)

●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		OFF	ON	OFF	OFF	OFF	OFF	OFF	OFF	ON	OFF	OFF	OFF	OFF	ON	OFF	OFF	ON
Leakage current		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	tPLZ	OFF	OFF	OFF	OFF	ON	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
CONT →OUT	tPZL	OFF	ON	OFF	OFF	OFF	OFF	OFF	OFF	OFF	ON	OFF	ON	ON	OFF	ON	ON	OFF
Sine wave distortion		ON	OFF	OFF	OFF	OFF	ON	OFF	OFF	OFF	ON	OFF	OFF	OFF	OFF	ON	ON	OFF
Feedthrough attenuation		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

●Operation Notes

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.

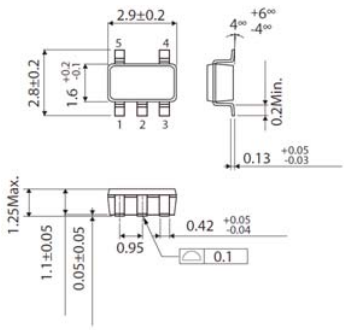
9. Ground Wiring Pattern

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.

●External Dimensions

SSOP5

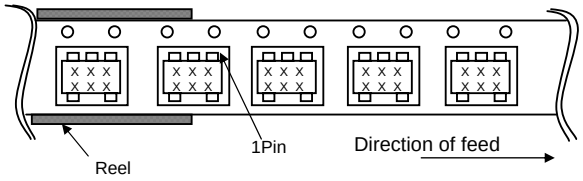
Dimensions



(Unit:mm)

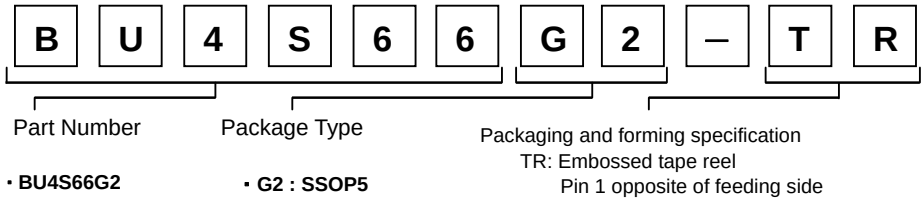
Tape and Reel Information

Tape	Embossed carrier tape
Quantity	3.000pcs
Direction of feed	TR (Pin 1 is at the upper right when holding the reel with the left hand while pulling the tape towards the right)



※Please order in multiples of the minimum package size

●Part Number Explanation



・**BU4S66G2**

・**G2 : SSOP5**

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