

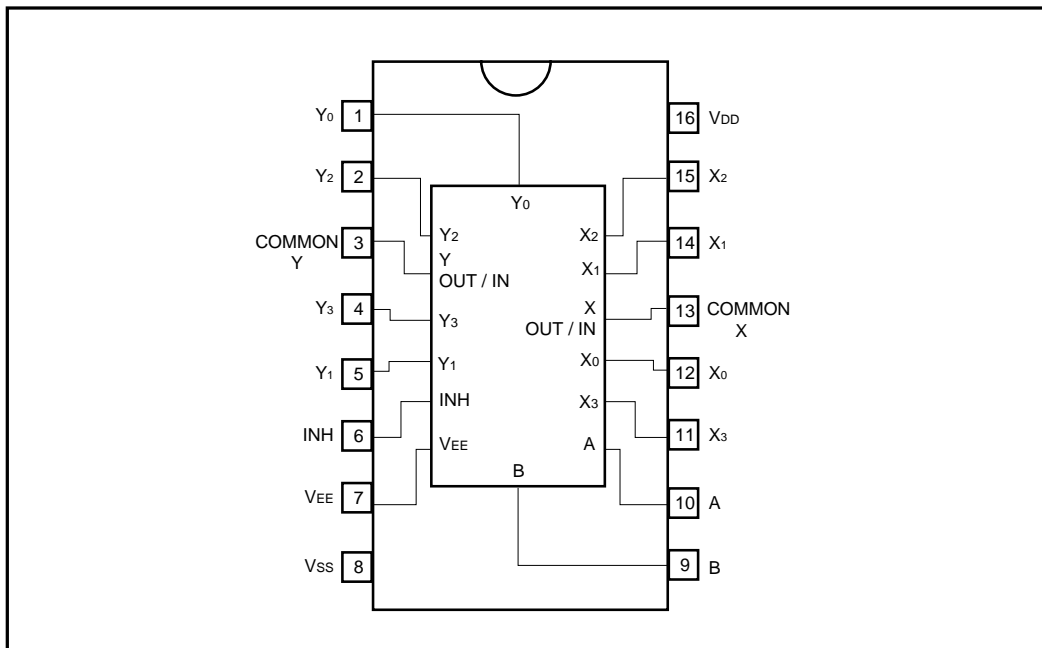
# Dual 4-channel analog multiplexer / demultiplexer

## BU4052BC / BU4052BCF / BU4052BCFV

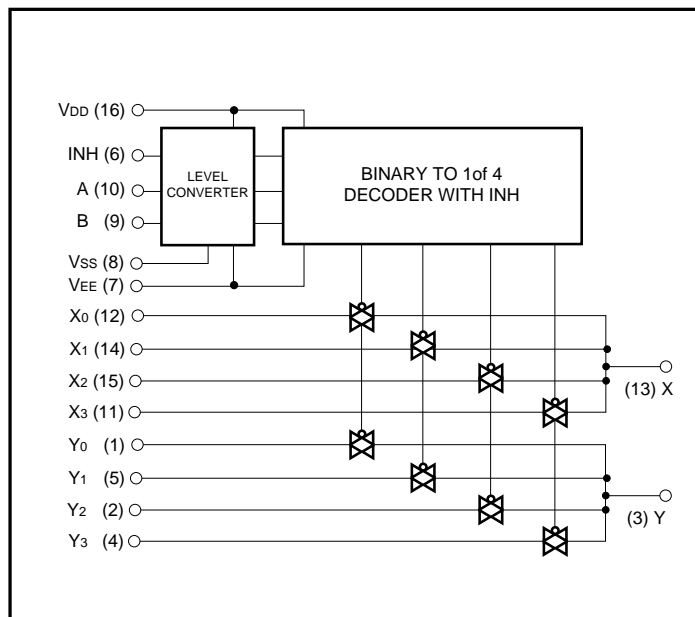
The BU4052BC, BU4052BCF, and BU4052BCFV are multiplexers / demultiplexers capable of selecting and combining analog signals and digital signals with a configuration of 4 ch × 2.

Inhibit signals and control signals are used to turn on the switch of the corresponding channel. In addition, even if the logical amplitude ( $V_{DD}-V_{SS}$ ) of the control signal is low, signals with a large amplitude ( $V_{DD}-V_{EE}$ ) can be switched. In addition, as each switch has a low ON resistance, it can be connected to a low impedance circuit.

### ●Block diagram



●Logic circuit diagram



●Truth table

INH	A	B	ON SWITCH
L	L	L	X <sub>0</sub> Y <sub>0</sub>
L	H	L	X <sub>1</sub> Y <sub>1</sub>
L	L	H	X <sub>2</sub> Y <sub>2</sub>
L	H	H	X <sub>3</sub> Y <sub>3</sub>
H	X	X	NONE

X: Irrelevant

●Absolute maximum ratings (Ta = 25°C)

Parameter	Symbol	Limits	Unit
Power supply voltage 1	V <sub>DD</sub>	- 0.5 ~ + 20	V
Power supply voltage 2	V <sub>DD</sub> — V <sub>EE</sub>	- 0.5 ~ + 20	V
Power dissipation	P <sub>d</sub>	1000 (DIP), 500 (SOP), 400 (SSOP)	mW
Operating temperature	T <sub>opr</sub>	- 40 ~ + 85	°C
Storage temperature	T <sub>stg</sub>	- 55 ~ + 150	°C
Input voltage	V <sub>IN</sub>	- 0.5 ~ V <sub>DD</sub> + 0.5	V

## ●Electrical characteristics

DC characteristics (unless otherwise noted,  $T_a = 25^\circ\text{C}$ ,  $V_{EE} = V_{SS} = 0\text{V}$ )

Parameter	Symbol	Min.	Typ.	Max.	Unit	V <sub>DD</sub> (V)	Conditions	Measurement circuit
High-level input voltage	V <sub>IH</sub>	3.5	—	—	V	5	—	Fig.1
		7.0	—	—		10		
		11.0	—	—		15		
Low-level input voltage	V <sub>IL</sub>	—	—	1.5	V	5	—	Fig.1
		—	—	3.0		10		
		—	—	4.0		15		
High-level input current	I <sub>IH</sub>	—	—	0.3	μA	15	V <sub>IH</sub> = 15V	Fig.1
Low-level input current	I <sub>IL</sub>	—	—	-0.3	μA	15	V <sub>IL</sub> = 0V	Fig.1
ON resistance	R <sub>ON</sub>	—	—	950	Ω	5	V <sub>IN</sub> = V <sub>DD</sub> / 2	Fig.2
		—	—	250		10		
		—	—	160		15		
ON resistance deflexion	ΔR <sub>ON</sub>	—	10	—	Ω	5	—	Fig.2
		—	6	—		10		
		—	4	—		15		
OFF-channel leakage current	I <sub>OFF</sub>	—	—	0.3	μA	15	—	Fig.3
		—	—	-0.3		15		
Static current dissipation	I <sub>DD</sub>	—	—	5	μA	5	V <sub>I</sub> = V <sub>DD</sub> or GND	—
		—	—	10		10		
		—	—	15		15		

Switching characteristics (unless otherwise noted, Ta = 25°C, VEE = VSS = 0V, RL = 1kΩ, CL = 50pF)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions		Measurement circuit
						VDD (V)		
Propagation delay time Switch IN → OUT	tPLH, tPHL	—	15	45	ns	5	—	Fig.4
		—	8	20		10		
		—	6	15		15		
Propagation delay time CONT → OUT	tPHZ, tPLZ tPZH, tPZL	—	170	550	ns	5	—	Fig.5, 6
		—	90	240		10		
		—	70	160		15		
Propagation delay time INH → OUT	tPHZ, tPLZ tPZH, tPZL	—	150	380	ns	5	—	Fig.5, 6
		—	70	200		10		
		—	50	160		15		
Maximum propagation frequency	fMax.	—	20	—	MHz	5	VEE = -5V*1	Fig.7
Feedthrough attenuation	FT	—	0.5	—	MHz	5	VEE = -5V*2	Fig.7
Sine wave distortion ratio	D	—	0.02	—	%	5	VEE = -5V*3	Fig.7
Input capacitance (control)	Cc	—	5	—	pF	—	—	—
Input capacitance (switch)	Cs	—	10	—	pF	—	—	—

\*1 VIN = 5Vp-p sine wave, frequency that enables 20 log10 VOUT / VIN = -3dB.  
 \*2 VIN = 5Vp-p sine wave, frequency that enables 20 log10 VOUT / VIN = -50dB at channel off.  
 \*3 VIN = 5Vp-p sine wave.

● Measurement circuits

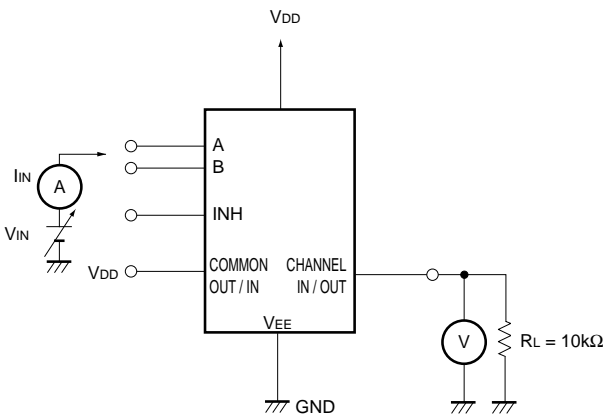


Fig.1 Input voltage, current

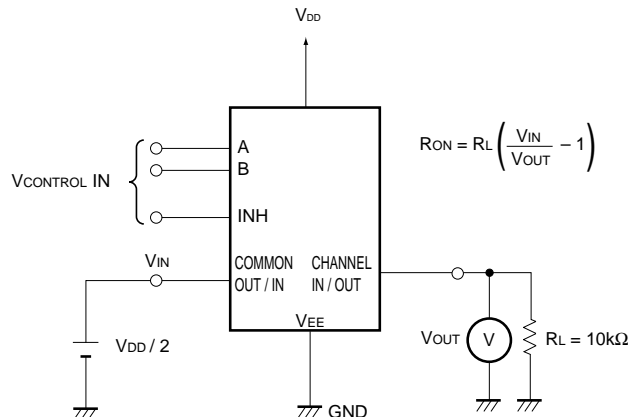


Fig.2 ON resistance

$$R_{ON} = R_L \left( \frac{V_{IN}}{V_{OUT}} - 1 \right)$$

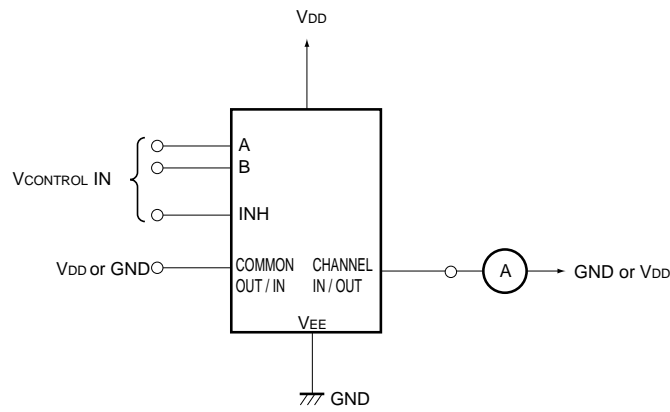


Fig.3 OFF-channel leakage current

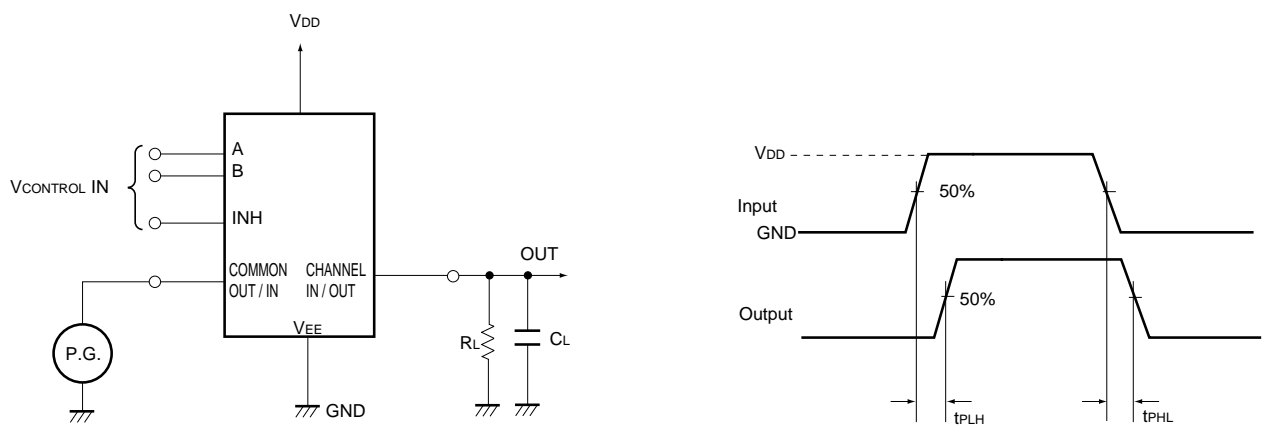


Fig.4 Propagation delay time (Switch IN to OUT)

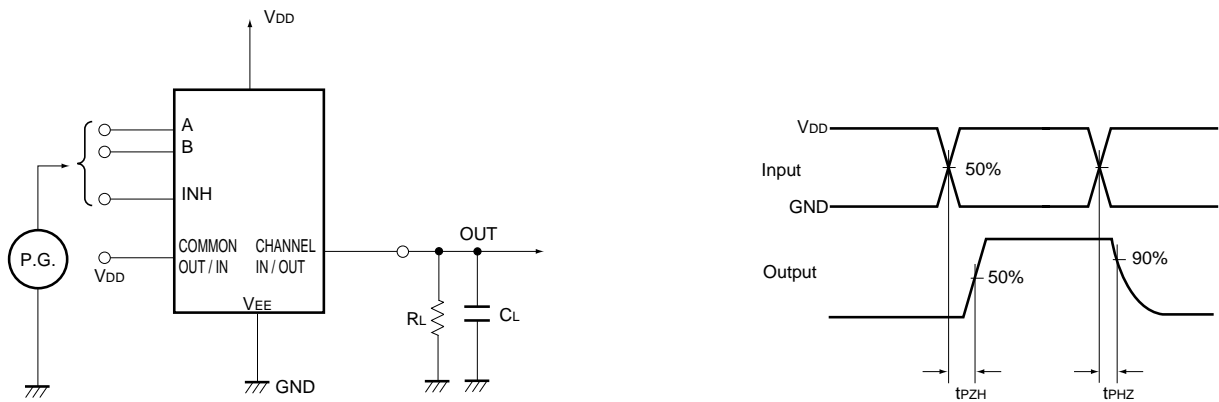


Fig.5 Propagation delay time (CONT, INH to OUT)

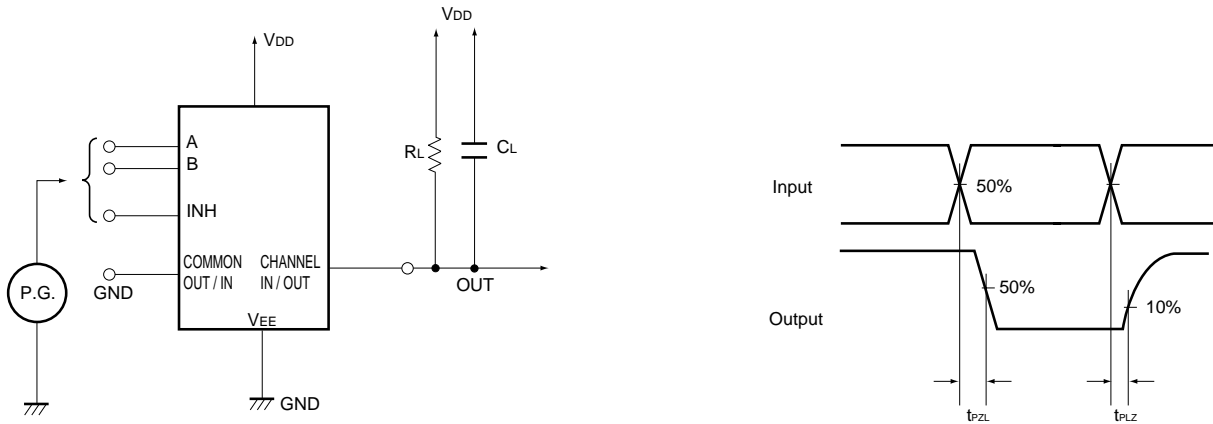


Fig.6 Propagation delay time (CONT, INH to OUT)

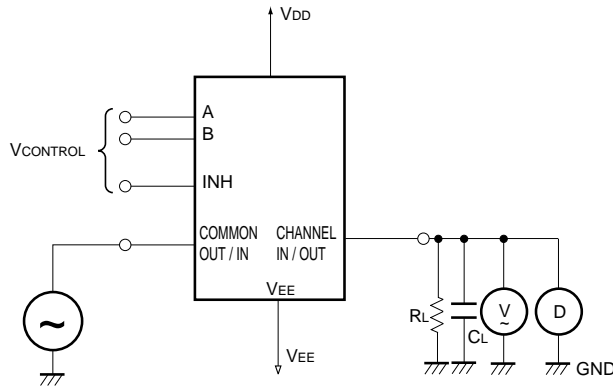


Fig.7 Maximum propagation frequency, feedthrough, sine wave distortion

●Electrical characteristic curve

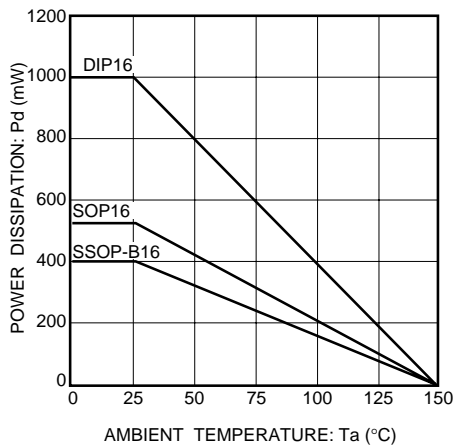


Fig.8 Power dissipation vs. Ta characteristic

● External dimensions (Units: mm)

