

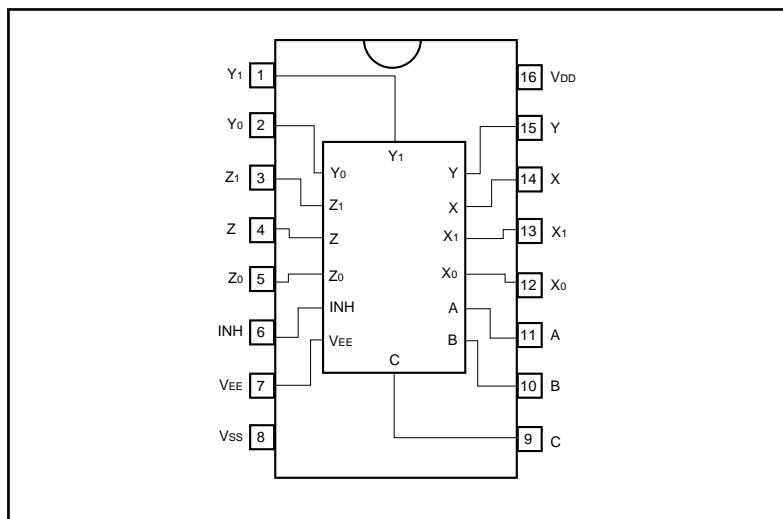
Triple 2-channel analog multiplexer / demultiplexer

BU4053BC / BU4053BCF / BU4053BCFV

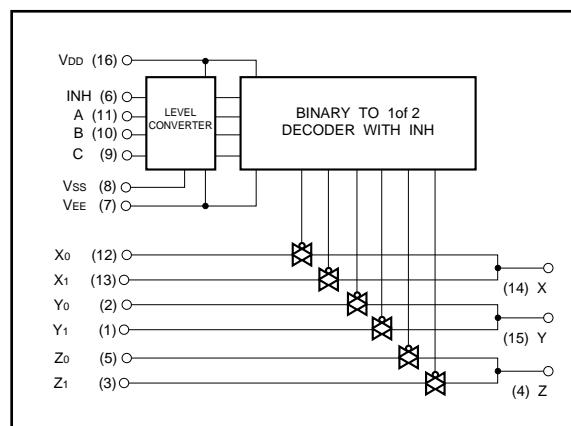
The BU4053BC, BU4053BCF, and BU4053BCFV are multiplexers / demultiplexers capable of selecting and combining analog signals and digital signals in a 2 ch × 3 configuration. Inhibit signals and control signals are used to turn on the switch corresponding to each of the channels. In addition, even if the logical amplitude ($V_{DD}-V_{SS}$) of the control signal is low, signals with a large amplitude ($V_{DD}-V_{EE}$) can be switched.

Also, 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	C	ON SWITCH
L	L	L	L	X ₀ Y ₀ Z ₀
L	H	L	L	X ₁ Y ₀ Z ₀
L	L	H	L	X ₀ Y ₁ Z ₀
L	H	H	L	X ₁ Y ₁ Z ₀
L	L	L	H	X ₀ Y ₀ Z ₁
L	H	L	H	X ₁ Y ₀ Z ₁
L	L	H	H	X ₀ Y ₁ Z ₁
L	H	H	H	X ₁ Y ₁ Z ₁
H	X	X	X	NONE

X: Irrelevant

● Absolute maximum ratings ($T_a = 25^\circ\text{C}$)

Parameter	Symbol	Limits	Unit
Power supply voltage1	V_{DD}	- 0.5 ~ + 20	V
Power supply voltage2	$V_{DD} - V_{EE}$	- 0.5 ~ + 20	V
Power dissipation	P_d	1000 (DIP), 500 (SOP), 400 (SSOP)	mW
Operating temperature	T_{opr}	- 40 ~ + 85	$^\circ\text{C}$
Storage temperature	T_{stg}	- 55 ~ + 150	$^\circ\text{C}$
Input voltage	V_{IN}	- 0.5 ~ $V_{DD} + 0.5$	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_{DD} (V)	Conditions	Measurement circuit
Input high-level voltage	V_{IH}	3.5	—	—	V	5	—	Fig.1
		7.0	—	—		10		
		11.0	—	—		15		
Input low-level voltage	V_{IL}	—	—	1.5	V	5	—	Fig.1
		—	—	3.0		10		
		—	—	4.0		15		
Input high-level current	I_{IH}	—	—	0.3	μA	15	$V_{IH} = 15\text{V}$	Fig.1
Input low-level current	I_{IL}	—	—	- 0.3	μA	15	$V_{IL} = 0\text{V}$	Fig.1
R_{ON} resistance	R_{ON}	—	—	950	Ω	5	$V_{IN} = V_{DD} / 2$	Fig.2
		—	—	250		10		
		—	—	160		15		
R_{ON} resistance deflection	ΔR_{ON}	—	10	—	Ω	5	—	Fig.2
		—	6	—		10		
		—	4	—		15		
OFF-channel leakage current	I_{OFF}	—	—	0.3	μA	15	—	Fig.3
		—	—	- 0.3		15		
Static current dissipation	I_{DD}	—	—	5	μA	5	$V_I = V_{DD}$ or GND	—
		—	—	10		10		
		—	—	15		15		

Switching characteristics (unless otherwise noted, $T_a = 25^\circ\text{C}$, $V_{EE} = V_{SS} = 0\text{V}$, $R_L = 1\text{k}\Omega$, $C_L = 50\text{pF}$)

Parameter	Symbol	Min.	Typ.	Max.	Unit	V_{DD} (V)	Conditions	Measurement circuit
Propagation delay time Switch IN→OUT	t_{PLH}, t_{PHL}	—	15	45	ns	5	—	Fig.4
		—	8	20		10		
		—	6	15		15		
Propagation delay time CONT→OUT	t_{PHZ}, t_{PLZ} t_{PZH}, t_{PZL}	—	170	550	ns	5	—	Fig.5, 6
		—	90	240		10		
		—	70	160		15		
Propagation delay time INH→OUT	t_{PHZ}, t_{PLZ} t_{PZH}, t_{PZL}	—	150	380	ns	5	—	Fig.5, 6
		—	70	200		10		
		—	50	160		15		
Max. propagation frequency	$f_{Max.}$	—	20	—	MHz	5	$V_{EE} = -5\text{V}^*$	Fig.7
Feedthrough attenuation	FT	—	0.5	—	MHz	5	$V_{EE} = -5\text{V}^{*2}$	Fig.7
Sine wave distortion	D	—	0.02	—	%	5	$V_{EE} = -5\text{V}^{*3}$	Fig.7
Input capacitance (control)	C_c	—	5	—	pF	—	—	—
Input capacitance (switch)	C_s	—	10	—	pF	—	—	—

*1 $V_{IN} = 5\text{Vp-p}$ sine wave, frequency that enables $20 \log_{10} \frac{V_{OUT}}{V_{IN}} = -3\text{dB}$.

*2 $V_{IN} = 5\text{Vp-p}$ sine wave, frequency that enables $20 \log_{10} \frac{V_{OUT}}{V_{IN}} = -50\text{dB}$ at channel off.

*3 $V_{IN} = 5\text{Vp-p}$ sine wave.

● Measurement circuits

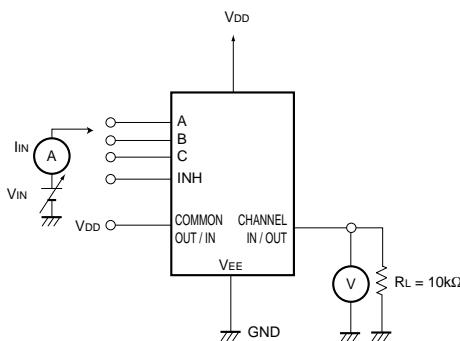


Fig. 1 Input voltage, current

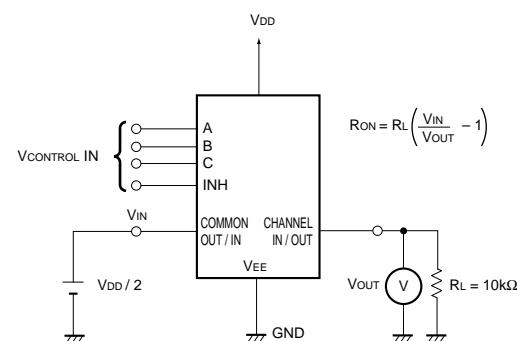


Fig. 2 ON resistance

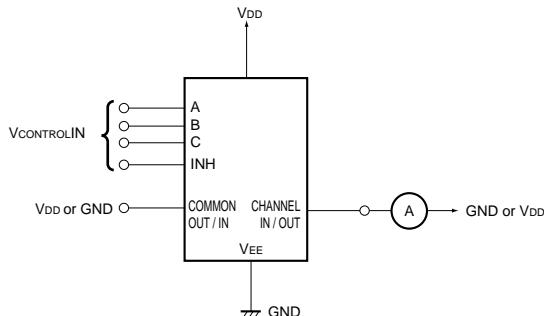


Fig. 3 Channel-OFF leakage current

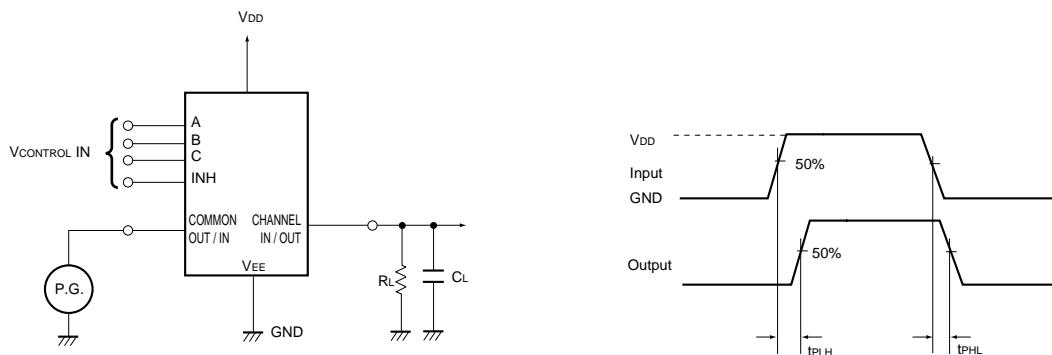


Fig. 4 Propagation delay time (Switch IN to OUT)

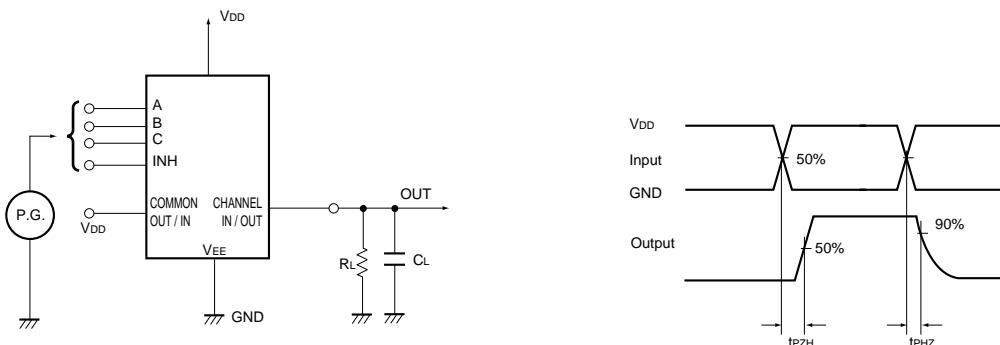


Fig. 5 Propagation delay time (CONT, INH to OUT)

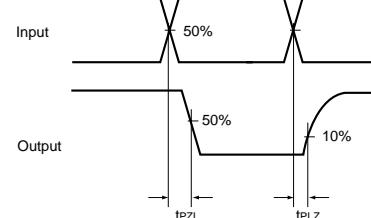
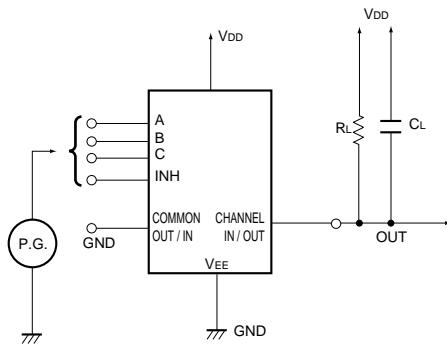


Fig. 6 Propagation delay time (CONT, INH to OUT)

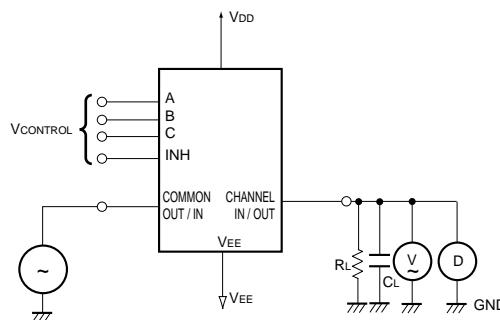


Fig. 7 Maximum propagation frequency, feedthrough, sine wave distortion

●Electrical characteristic curve

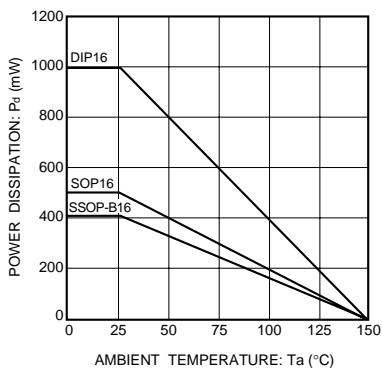
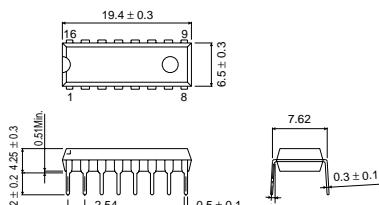


Fig. 8 Power dissipation vs. Ta

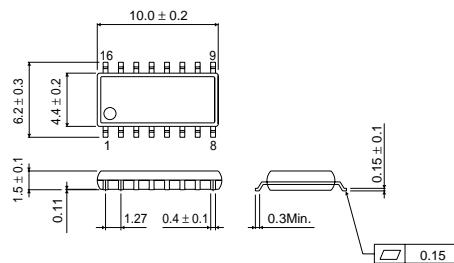
● External dimensions (Units: mm)

BU4053BC



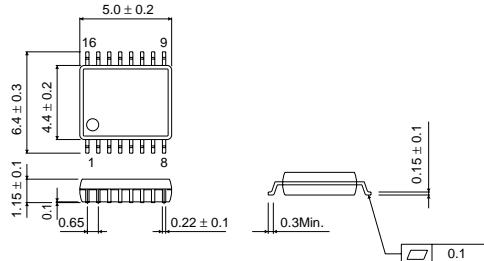
DIP16

BU4053BCF



SOP16

BU4053BCFV



SSOP-B16