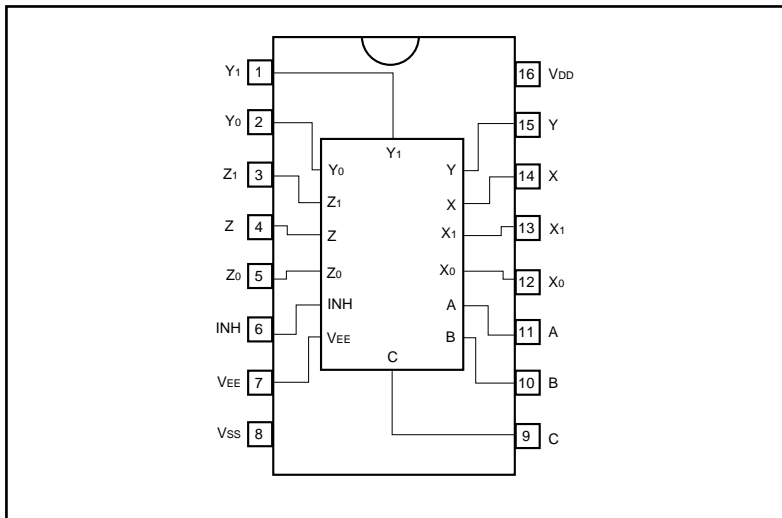# Triple 2-channel analog multiplexer / demultiplexer
BU4053BC / BU4053BCF / BU4053BCFV
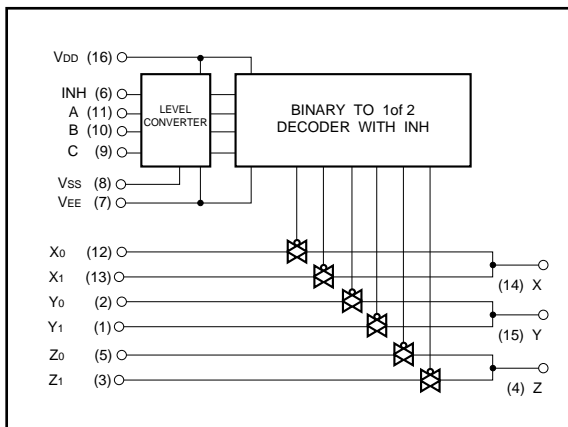
The BU4053BC, BU4053BCF, and BU4053BCFV are multiplexers / demultiplexers capable of selecting and combining analog signals and digital signals in a 2 ch × 3 configuration. Inhibit signals and control signals are used to turn on the switch corresponding to each of the channels. In addition, even if the 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 (Ta = 25°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	Pd	1000 (DIP), 500 (SOP), 400 (SSOP)	mW
Operating temperature	Topr	− 40 ~ + 85	°C
Storage temperature	Tstg	− 55 ~ + 150	°C
Input voltage	V_{IN}	− 0.5 ~ V_{DD} + 0.5	V

●Electrical characteristics

DC characteristics (unless otherwise noted, Ta = 25°C, V_{EE} = V_{SS} = 0V)

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} = 15V	Fig.1
Input low-level current	I_{IL}	—	—	− 0.3	μA	15	V_{IL} = 0V	Fig.1
R_{ON} resistance	R_{ON}	—	—	950	Ω	5	V_{IN} = V_{DD} / 2	Fig.2
		—	—	250		10		
		—	—	160		15		
R_{ON} resistance deflexion	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		

ROHM

Switching characteristics (unless otherwise noted, Ta = 25°C, V_{EE} = V_{SS} = 0V, R_L = 1kΩ, C_L = 50pF)

Parameter	Symbol	Min.	Typ.	Max.	Unit	V_{DD} (V)	Conditions	Mesurement 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} = − 5V[*1]	Fig.7
Feedthrough attenuation	FT	—	0.5	—	MHz	5	V_{EE} = − 5V[*2]	Fig.7
Sine wave distortion	D	—	0.02	—	%	5	V_{EE} = − 5V[*3]	Fig.7
Input capacitance (control)	C_C	—	5	—	pF	—	—	—
Input capacitance (switch)	C_S	—	10	—	pF	—	—	—

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

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

*3 V_{IN} = 5V_{P-P} sine wave.
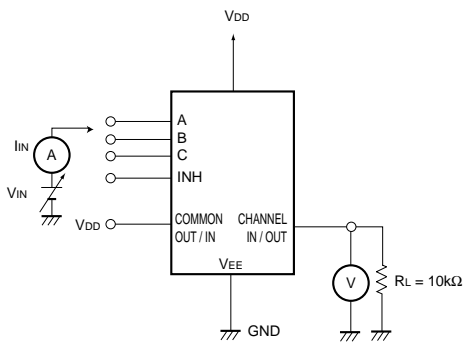
●Measurement circuits

Fig. 1 Input voltage, current

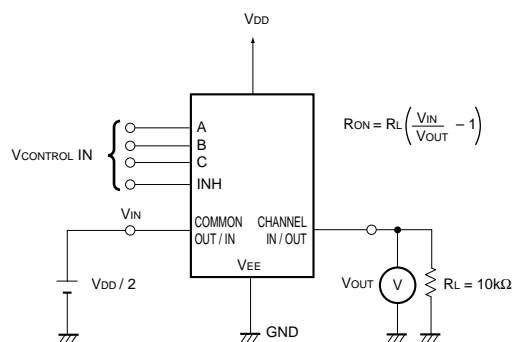$$R_{ON} = R_L \left(\frac{V_{IN}}{V_{OUT}} - 1 \right)$$
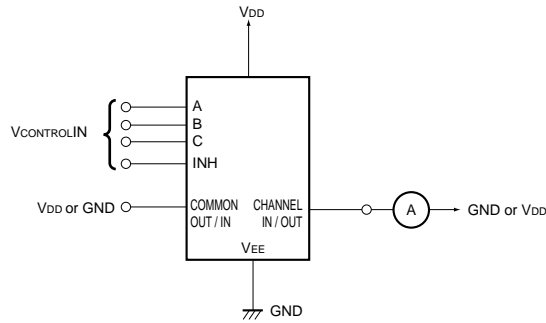
Fig. 2 ON resistance
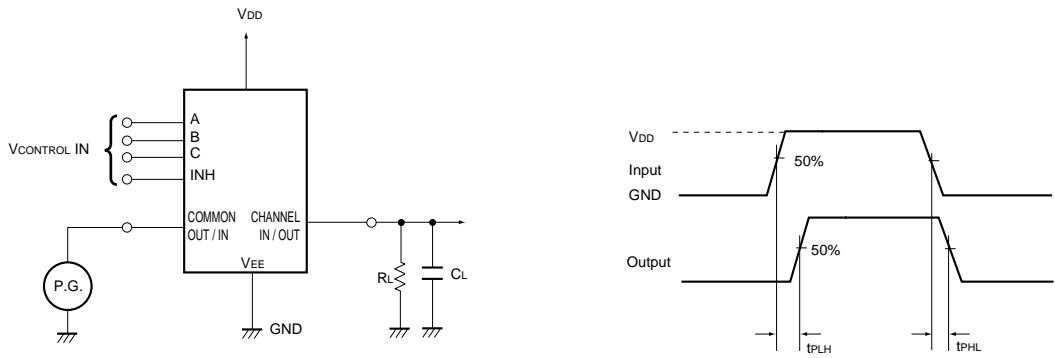
Fig. 3 Channel-OFF leakage current

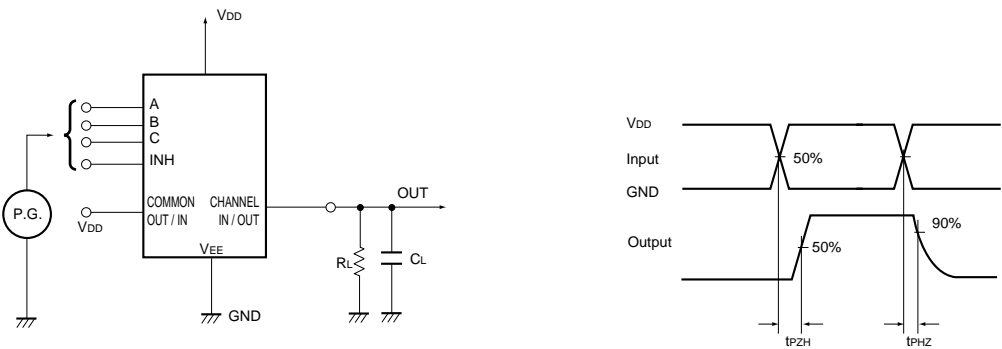Fig. 4 Propagation delay time (Switch IN to OUT)

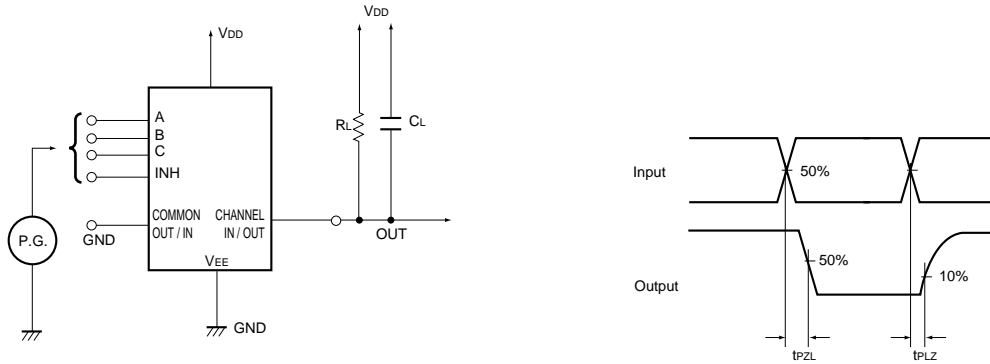Fig. 5 Propagation delay time (CONT, INH to OUT)

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

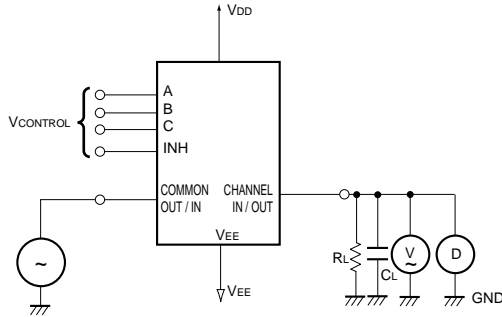

Fig. 7 Maximum propagation frequency, feedthrough,
　　　　sine wave distortion

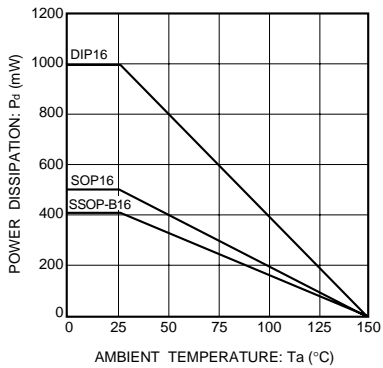●Electrical characteristic curve

Fig. 8 Power dissipation vs. Ta

●External dimensions (Units: mm)

BU4053BC

19.4 ± 0.3

16

9

6.5 ± 0.3

1

8

0.5Min.

4.25 ± 0.3

3.2 ± 0.2

2.54

0.5 ± 0.1

7.62

0.3 ± 0.1

0° ~ 15°

DIP16

BU4053BCF

10.0 ± 0.2

16

9

6.2 ± 0.3

4.4 ± 0.2

1

8

1.5 ± 0.1

0.11

1.27

0.4 ± 0.1

0.3Min.

0.15 ± 0.1

0.15

SOP16

BU4053BCFV

5.0 ± 0.2

16

9

6.4 ± 0.3

4.4 ± 0.2

1

8

1.15 ± 0.1

0.1

0.65

0.22 ± 0.1

0.3Min.

0.15 ± 0.1

0.1

SSOP-B16

ROHM