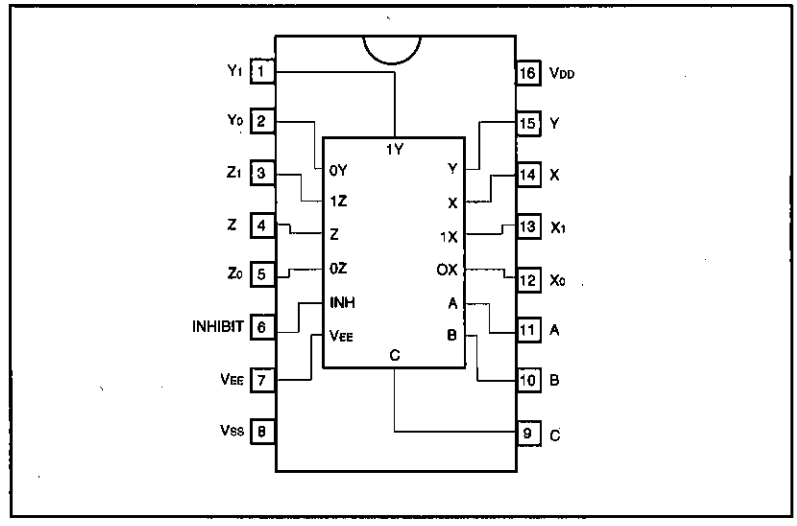
Triple 2-channel analog multiplexer/ demultiplexer

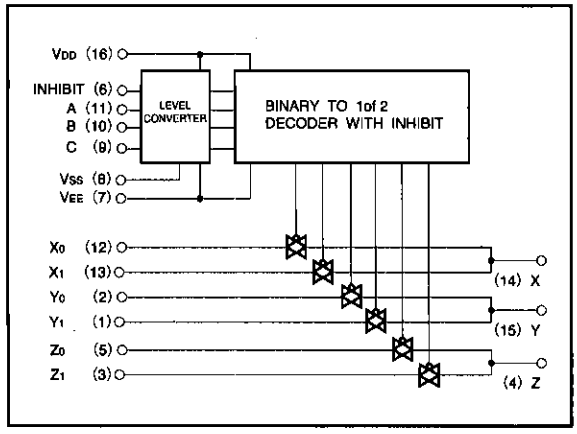
BU4053BC/BU4053BCF/BU4053BCFV

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 diagram



●Truth table

INHIBIT	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 : Don't Care

●Absolute maximum ratings (Ta=25℃)

Parameter	Symbol	Limits	Unit
Power supply voltage	V_{DD} - V_{EE}	−0.3~20	V
Power dissipation	Pd	1000 (DIP), 500 (SOP), 400 (SSOP)	mW
Operating temperature	Topr	−40~85	℃
Storage temperature	Tstg	−55~150	℃
Input voltage	V_{IN}	−0.3~V_{DD}+0.3	V

●Electrical characteristics

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

Parameter	Symbol	Min.	Typ.	Max.	Unit	V_{DD} (V)	Conditions	Measurement Circuit
High-level input voltage	V_{IH}	3.5	—	—	V	5	—	Fig.1
		7.0	—	—		10		
		11.0	—	—		15		
Low-level input voltage	V_{IL}	—	—	1.5	V	5	—	Fig.1
		—	—	3.0		10		
		—	—	4.0		15		
High-level input current	I_{IH}	—	—	0.3	μA	15	V_{IH}=15V	Fig.1
Low-level input current	I_{IL}	—	—	−0.3	μA	15	V_{IL}=0V	Fig.1
R_{ON} resistance	R_{ON}	—	—	950	Ω	5	—	Fig.2
		—	—	250		10		
		—	—	160		15		
R_{ON} resistance deflexion	$\triangle R_{ON}$	—	25	—	Ω	5	—	Fig.2
		—	10	—		10		
		—	5	—		15		
OFF-channel leakage current	I_{OFF}	—	—	0.3	μA	15	—	Fig.3
		—	—	−0.3		15		
Quiescent supply current	I_{DD}	—	—	5	μA	5	V_I=V_{DD} or GND	—
		—	—	10		10		
		—	—	15		15		

Switching characteristics (unless otherwise noted, Ta=25℃, $V_{EE}=V_{SS}=0V$, $R_L=1k\Omega$, $C_L=50pF$)

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_{PZL},t_{PZL}	—	170	450	ns	5	—	Fig.5, 6
		—	90	210		10		
		—	70	160		15		
Max. propagation frequency	$f_{Max.}$	—	15	—	MHz	5	V_{EE}=−5V*1	Fig.7
Feedthrough attenuation	FT	—	0.7	—	MHz	5	V_{EE}=−5V*2	Fig.7
Sinewave distortion	D	—	0.02	—	%	5	V_{EE}=−5V*3	Fig.7
Input capacitance (control)	Cc	—	5	—	pF	—	—	—
Input capacitance (switch)	Cs	—	10	—	pF	—	—	—

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

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

*3 V_{IN}= $5V_{p-p}$ sine wave

●Measurement circuits

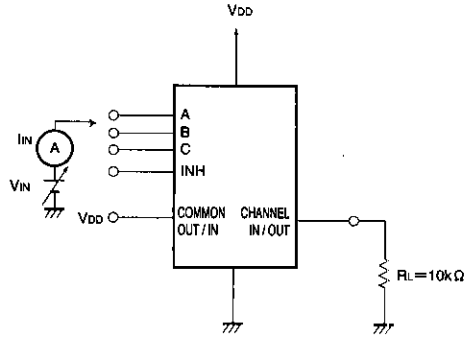


Fig. 1 Input voltage, current

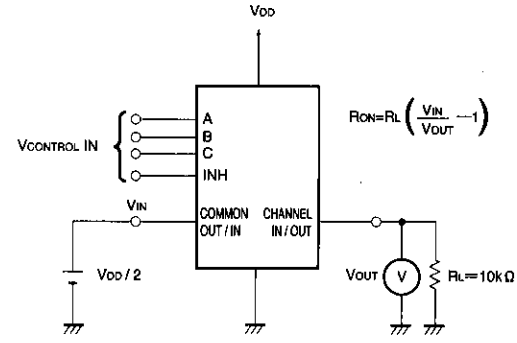


Fig. 2 ON resistance

●Measurement circuits

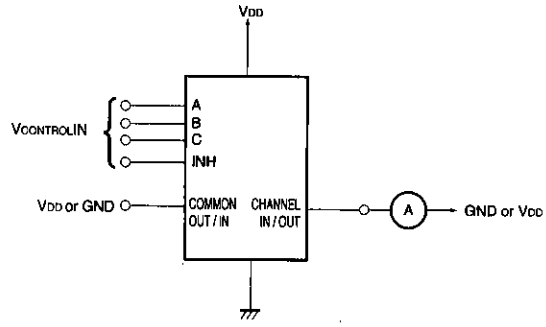


Fig. 3 Channel OFF leakage current

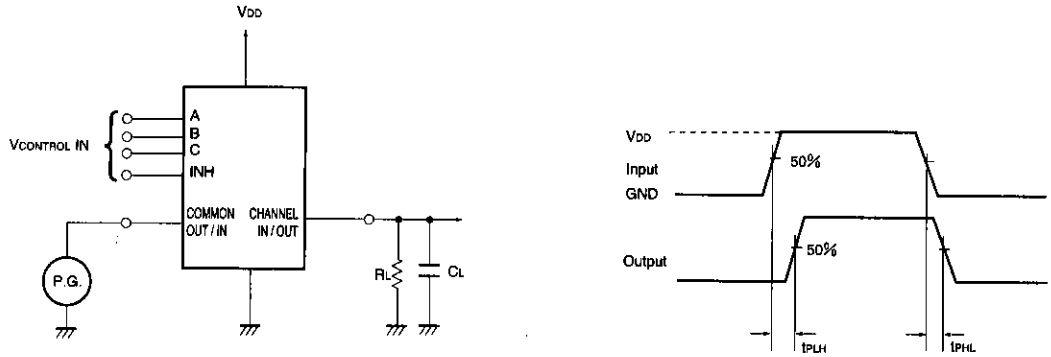


Fig. 4 Propagation delaytime (Switch IN to OUT)

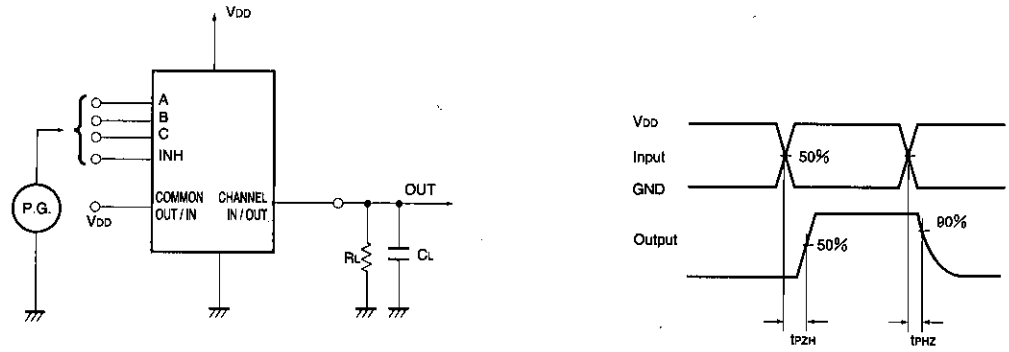


Fig. 5 Propagation delay time (CONT, INH to OUT)

●Measurement circuits

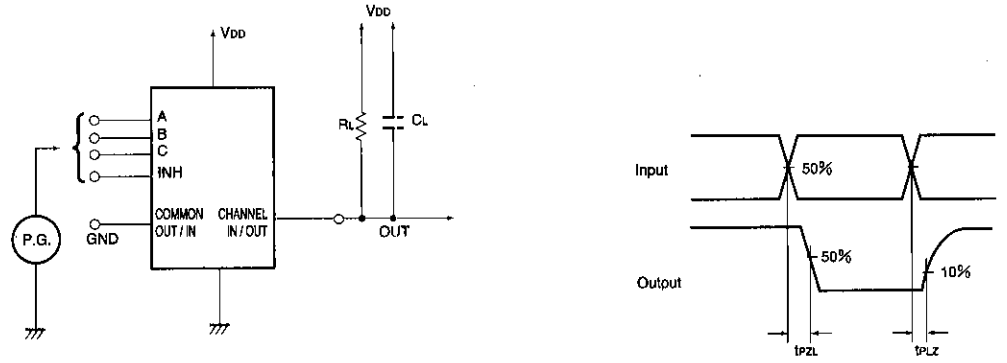


Fig. 6 Propagation delay time (CONT, INH to OUT)

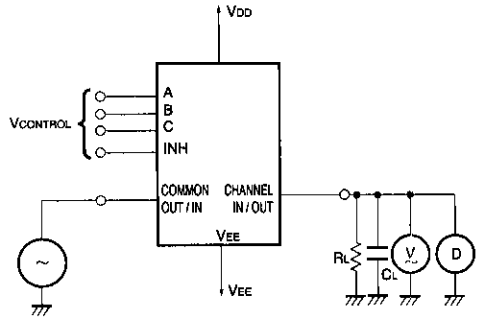


Fig. 7 Maximum propagation frequency, feedthrough, sine wave distortion

●Electrical characteristic curve

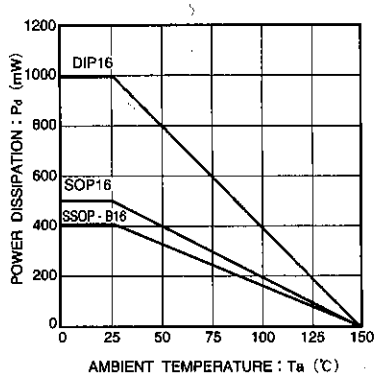
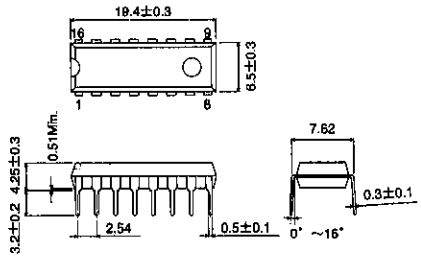


Fig. 8 Power dissipation - Ta characteristic

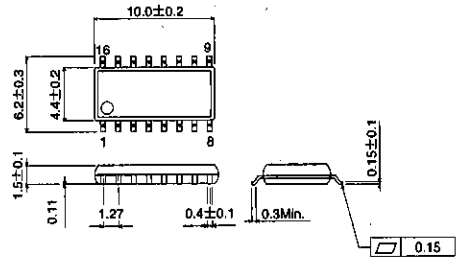
●External dimensions (Units: mm)

BU4053BC



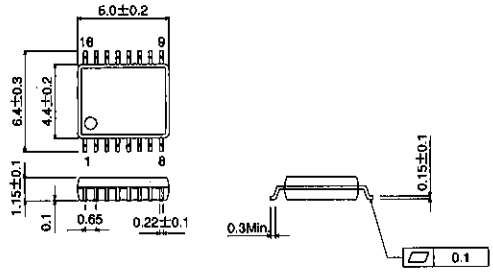
DIP16

BU4053BCF



SOP16

BU4053BCFV



SSOP - B16

Series Standard
BU4000B

The BU4000 Series are CMOS ICs featuring low voltage and low power consumption. The wide range of operating power supply voltages is compatible with the general-purpose 4000B Series, and when a 5V power supply voltage is used, the LS-TTL IC can be driven directly.
These ICs are available in SOP and SSOP packages as well as the standard DIP package.

●Features
1) Low power consumption.
2) Wide range of operating power supply voltages.
3) High input impedance.
4) High fan-out.
5) Direct drive of 2 L-TTL inputs and 1 LS-TTL input.

●Absolute maximum ratings (Ta = 25℃)

Parameter	Symbol	Limits	Unit
Power supply voltage	V_{DD}	18 *1	V
Input voltage	V_{IN}	−0.3~V_{DD}+0.3	V
Power dissipation *2	Pd	Please refer to specifications for indlvidual package	mW
Storage temperature	Tstg	−55~150	℃

*1 For the BU4XXXBC type, V_{DD} = 20 V.
*2 The values for the SOP and SSOP packages are the values when mounted on a glass epoxy PCB (50 mm x 50 mm x 1.6 mm).

●Recommended operating conditions (Ta = 25℃)

Parameter	Symbol	Limits	Unit
Power supply voltage	V_{DD}	3~16 *	V
Input voltage	V_{IN}	0~V_{DD}	V
Operating temperature	Topr	−40~85	℃

* For the BU4XXXBC type, V_{DD} = 3 to 18 V.

●Electrical characteristic curves

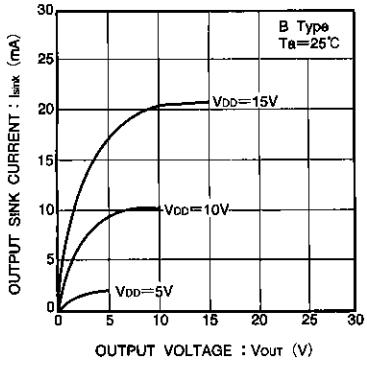


Fig.1 Output sink current - output voltage characteristic

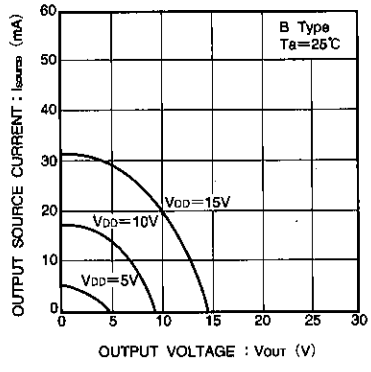


Fig.2 Output source current - output voltage characteristic

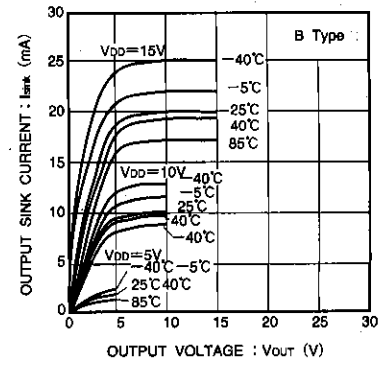


Fig.3 Output SINK current - output voltage characteristic

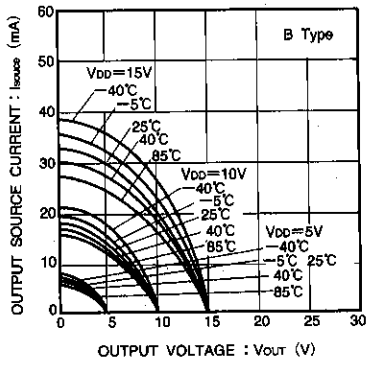


Fig.4 Output source current - output voltage characteristic

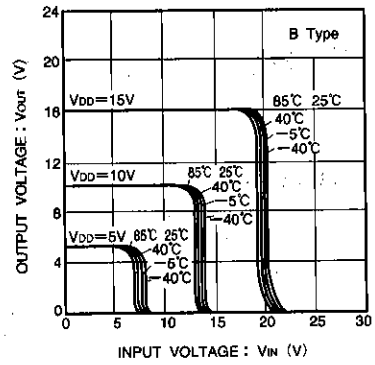


Fig.5 Output voltage - input voltage characteristic

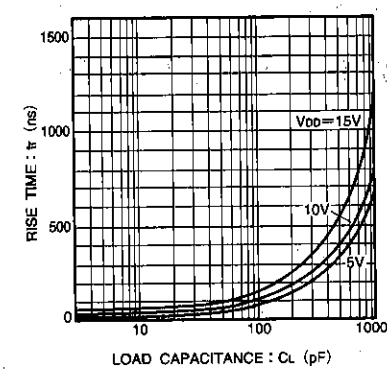


Fig.6 Rise time - load capacitance characteristic

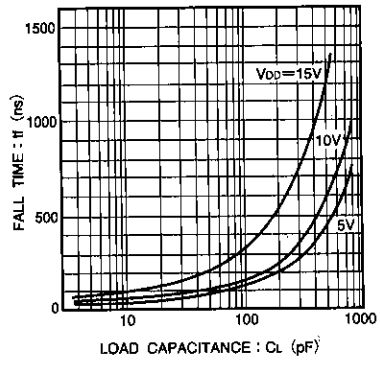


Fig.7 Fall time - load capacitance characteristic

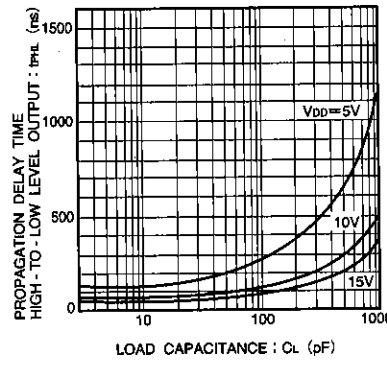


Fig.8 "H" to "L" propagation delay time - load capacitance characteristic

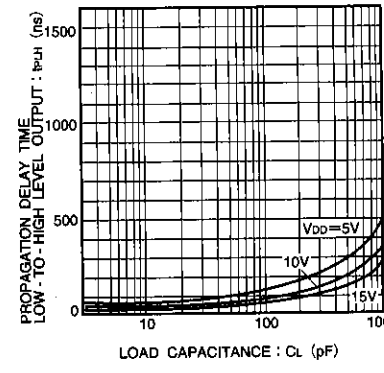


Fig.9 "L" to "H" propagation delay time - load capacitance characteristic

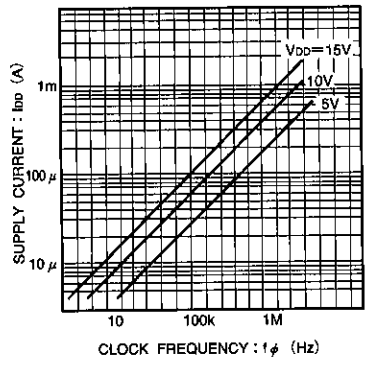


Fig.10 Supply current - clock frequency characteristic

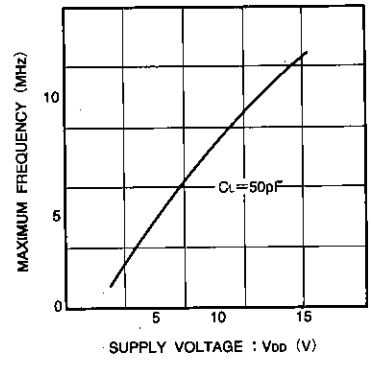


Fig.11 Maximum clock frequency - power supply voltage characteristic

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