

Standard ICs

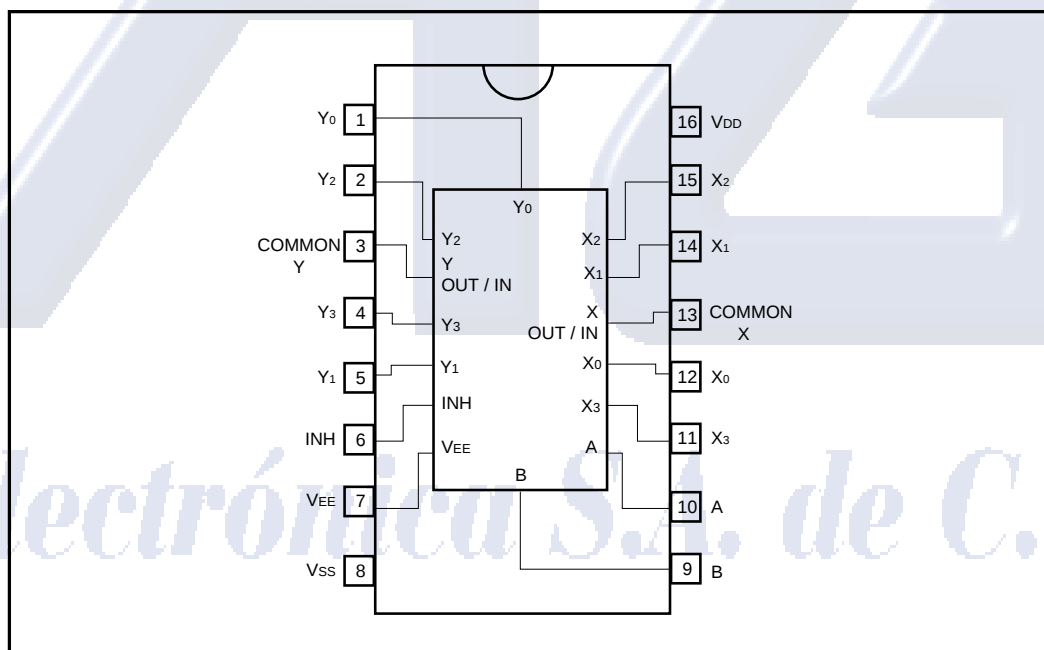
Dual 4-channel analog multiplexer / demultiplexer

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 $\times$ 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.

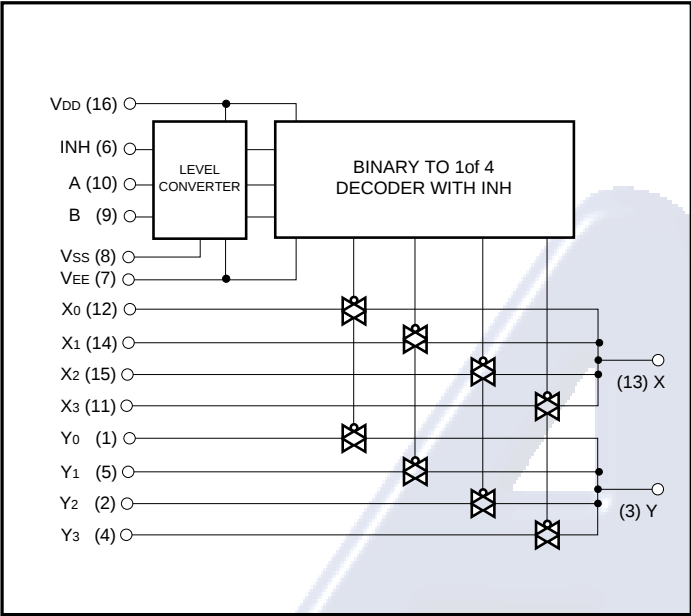
●Block diagram



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●Logic circuit diagram



●Truth table

INH	A	B	ON SWITCH
L	L	L	X ₀ Y ₀
L	H	L	X ₁ Y ₁
L	L	H	X ₂ Y ₂
L	H	H	X ₃ Y ₃
H	X	X	NONE

X: Irrelevant

●Absolute maximum ratings (Ta = 25°C)

Parameter	Symbol	Limits	Unit
Power supply voltage 1	V _{DD}	− 0.5 ~ + 20	V
Power supply voltage 2	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	°C
Storage temperature	T _{stg}	− 55 ~ + 150	°C
Input voltage	V _{IN}	− 0.5 ~ V _{DD} + 0.5	V

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●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
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
ON resistance	R _{ON}	—	—	950	Ω	5	V _{IN} = V _{DD} / 2	Fig.2
		—	—	250		10		
		—	—	160		15		
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		

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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		
Maximum propagation frequency	$f_{Max.}$	—	20	—	MHz	5	$V_{EE} = -5\text{V}^{*1}$	Fig.7
Feedthrough attenuation	FT	—	0.5	—	MHz	5	$V_{EE} = -5\text{V}^{*2}$	Fig.7
Sine wave distortion ratio	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 $V_{IN} = 5\text{V}_{P-P}$ sine wave, frequency that enables $20 \log_{10} V_{OUT} / V_{IN} = -3\text{dB}$.

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

*3 $V_{IN} = 5\text{V}_{P-P}$ sine wave.

● Measurement circuits

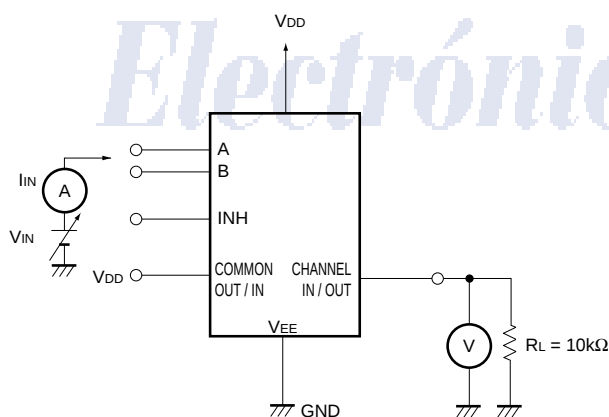


Fig.1 Input voltage, current

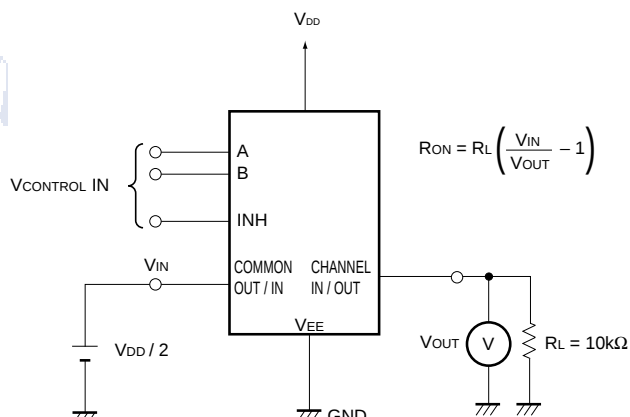


Fig.2 ON resistance

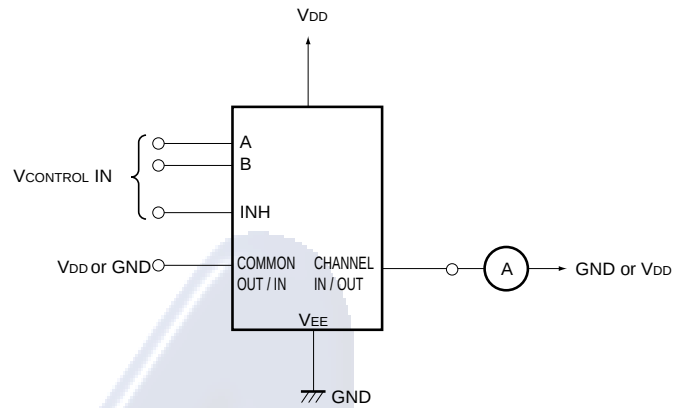


Fig.3 OFF-channel leakage current

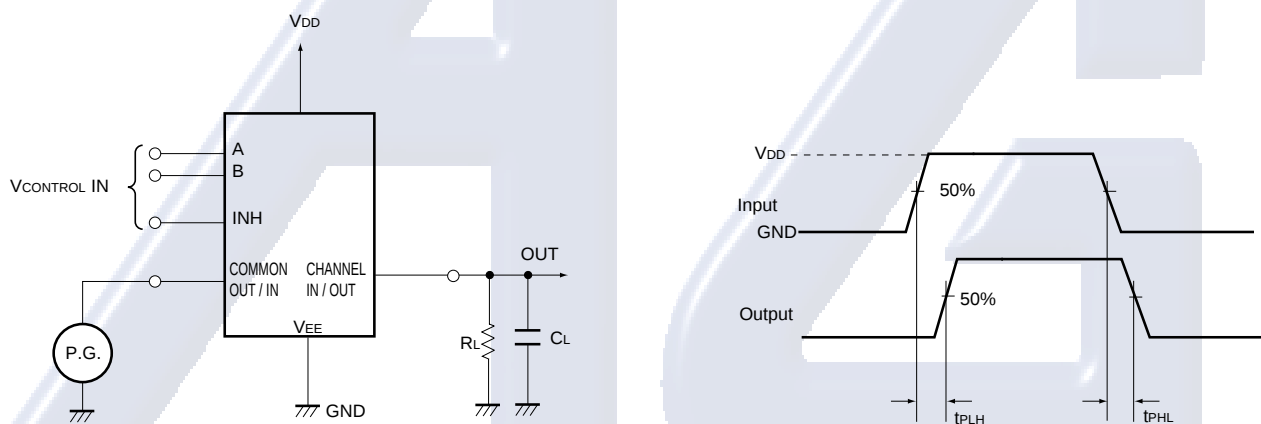


Fig.4 Propagation delay time (Switch IN to OUT)

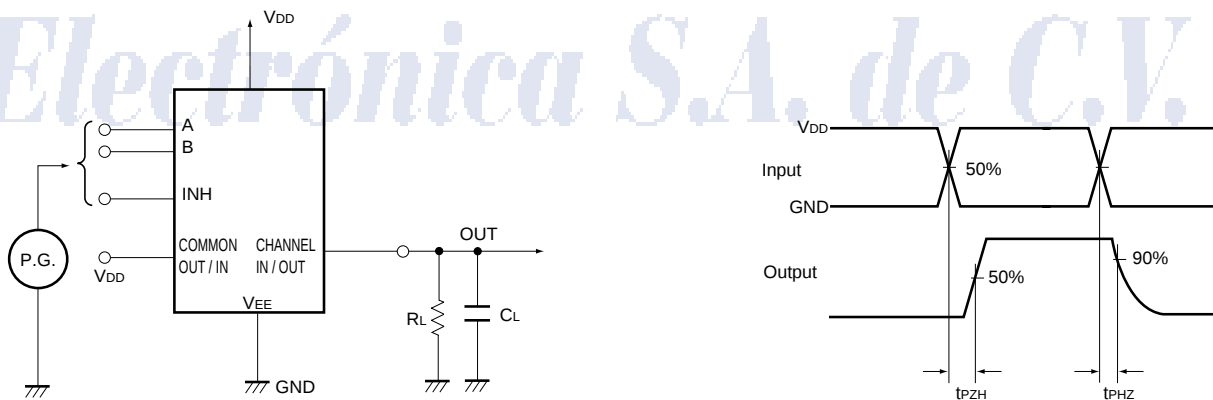


Fig.5 Propagation delay time (CONT, INH to OUT)

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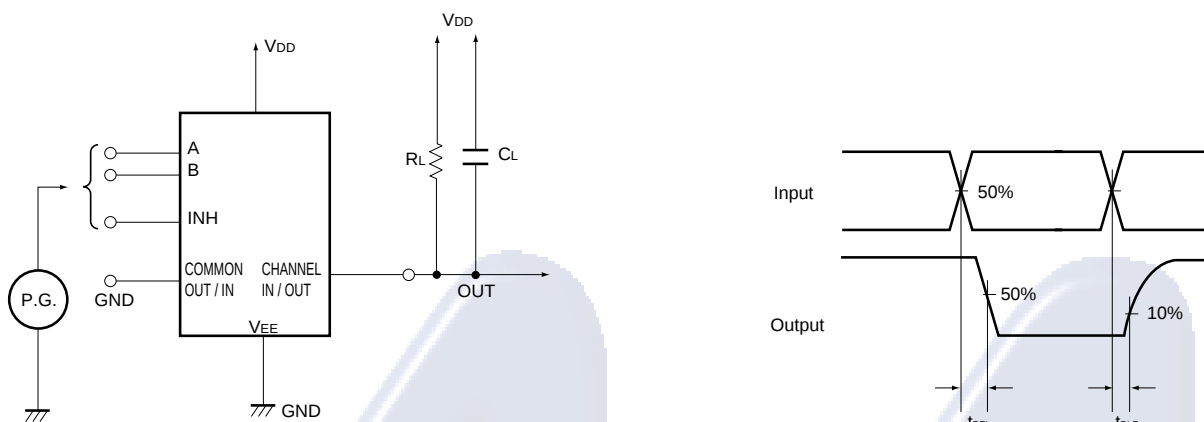


Fig.6 Propagation delay time (CONT, INH to OUT)

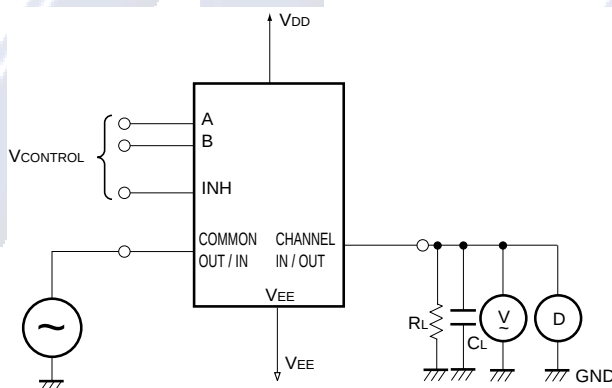


Fig.7 Maximum propagation frequency, feedthrough, sine wave distortion

●Electrical characteristic curve

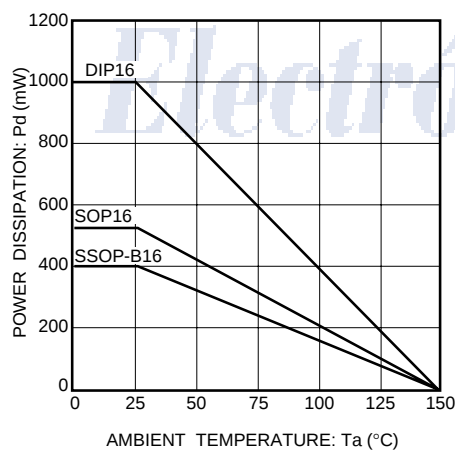
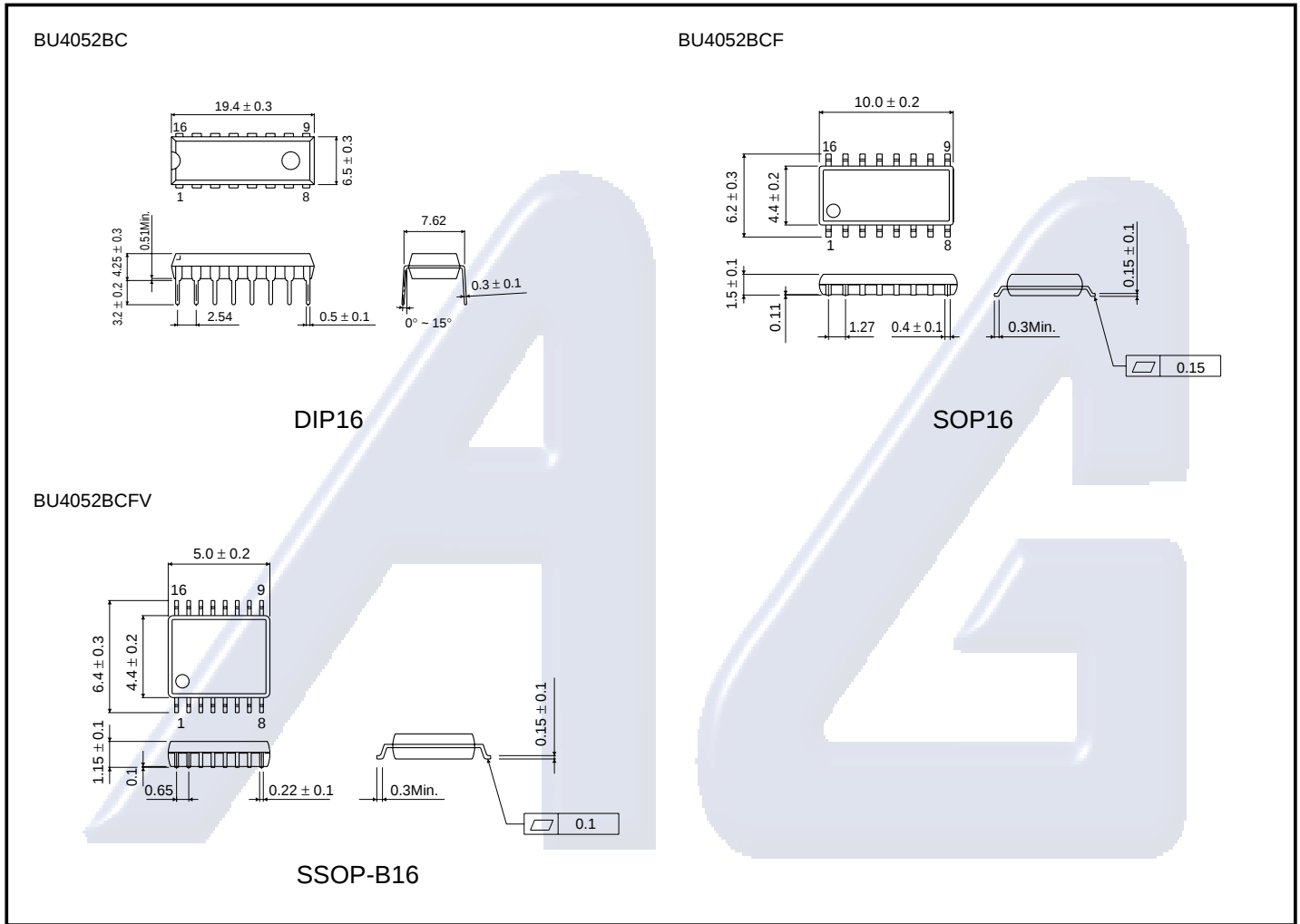


Fig.8 Power dissipation vs. Ta characteristic

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● External dimensions (Units: mm)



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