

DUAL 4-CHANNEL MULTIPLEXER

■ GENERAL DESCRIPTION

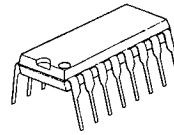
The NJU4052B is a dual 4-channel multiplexer with two binary control inputs and an inhibit input.

The two binary control input signals select 1 of 4 pairs of channels to be turned on and connect them to the two outputs.

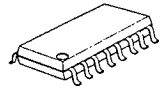
The operating voltage is as wide as 3 to 18V and the quiescent current is as low as 5μA max. (at V_{DD}=5V).

It is equivalent to RCA CD4052B and Motorola MC14052B.

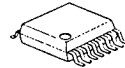
■ PACKAGE OUTLINE



NJU4052BD



NJU4052BM



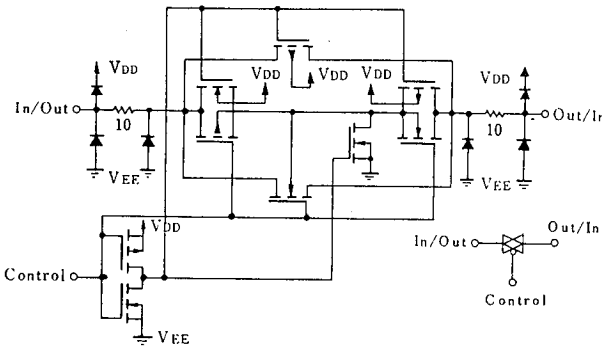
NJU4052BV

■ FEATURES

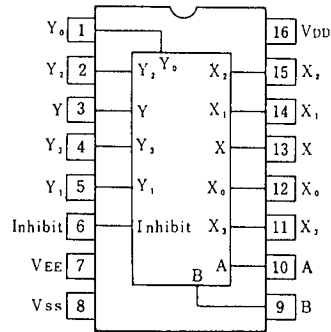
- High ON/OFF Output Voltage Ratio --- 65dB Typ.
(R_L=10kΩ)
- Low Quiescent Current --- 5μA Typ. at V_{DD}=5V
- Low Crosstalk between channels --- 80dB Typ.
- Wide Operating Voltage Range. --- 3 ~ 18V
- Linearity in the transfer characteristics.
ΔR_{ON}<60Ω (V_{IN}=V_{DD}~V_{EE}, V_{DD}=15V)
- Package Outline --- DIP/DMP/SSOP 16
- C-MOS Technology

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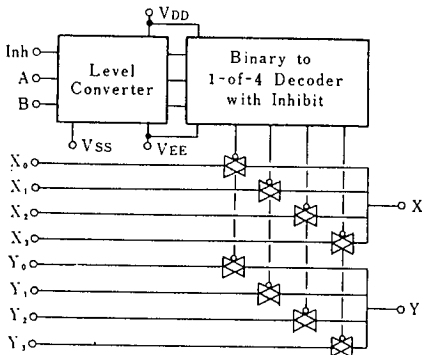
■ BLOCK DIAGRAM



■ PIN CONFIGURATION



■ EQUIVALENT CIRCUIT



■ TRUTH TABLE

| INH | B | A | On Switch | |
|-----|---|---|----------------|----------------|
| 0 | 0 | 0 | Y ₀ | X ₀ |
| 0 | 0 | 1 | Y ₁ | X ₁ |
| 0 | 1 | 0 | Y ₂ | X ₂ |
| 0 | 1 | 1 | Y ₃ | X ₃ |
| 1 | X | X | None | |

x: Don't Care

■ ABSOLUTE MAXIMUM RATINGS

(Ta=25°C)

| PARAMETER | SYMBOL | RATINGS | UNIT |
|-------------------------------|-------------------|--------------------------------------|------|
| Supply Voltage | $V_{DD} - V_{EE}$ | - 0.5 ~ + 20 | V |
| Input Voltage(Control Signal) | V_{IN} | $V_{SS}-0.5 \sim V_{DD}+0.5$ | V |
| Input Voltage(Analog Signal) | V_{SIG} | $V_{EE}-0.5 \sim V_{DD}+0.5$ | V |
| Input Current | I_{IN} | ± 10 | mA |
| Output Current | I_{OUT} | ± 10 | mA |
| Power Dissipation | P_D | 500 (DIP) 200 (DMP) 300 (SSOP) | mW |
| Operating Temperature Range | Topr | - 40 ~ + 85 | °C |
| Storage Temperature Range | Tstg | - 65 ~ + 150 | °C |

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■ ELECTRICAL CHARACTERISTICS

• DC Characteristics

 ($V_{SS}=0V$)

| PARAMETER | SYMBOL | CONDITIONS | V_{DD} (V) | Ta=-40°C | | Ta=25°C | | Ta=85°C | | UNIT |
|-------------------------------|-----------------|---|-----------------|----------|------------|---------|-----------|-----------|------------|----------|
| | | | | MIN | MAX | MIN | TYP | MAX | MIN | |
| Quiescent Current | I_{DD} | No signal Per Package | 5 | | | | | | 150 | μA |
| | | | 10 | | | | | 10 | 300 | |
| | | | 15 | | | | | 20 | 600 | |
| | | | 20 | | 100 | | 100 | 3000 | | |
| On-State Resistance | R_{ON} | $0 \leq V_{IS} \leq V_{DD}$ $V_{EE}=V_{SS}=0V$ | 5 | | 500 | | 220 | 600 | 800 | Ω |
| | | | 10 | | 210 | | 100 | 250 | 300 | |
| | | | 15 | | 140 | | 60 | 160 | 200 | |
| On-State Resistance Deviation | ΔR_{ON} | Between 2 channels $V_{EE}=V_{SS}=0V$ | 5 | | | | 15 | | | Ω |
| | | | 10 | | | | 10 | | | |
| | | | 15 | | | | 5 | | | |
| Off-Channel Leakage Current | | Each channel $V_{EE}=V_{SS}=0V$ | 18 | | ± 1000 | | ± 10 | ± 100 | ± 1000 | nA |
| Input Capacitance | C_{IN} | $V_{IN}=0V$ Control Inhibit Switch | | | | | 5.0 | 7.5 | | pF |
| Low Level Input Voltage | V_{IL} | $R_L=10k\Omega$ $SW=V_{DD}$ $V_{EE}=V_{SS}$ | $V_o=1.0V$ | 5 | | 1.5 | | 1.5 | 1.5 | V |
| | | | $V_o=1.0V$ | 10 | | 3.0 | | 3.0 | 3.0 | |
| | | | $V_o=1.5V$ | 15 | | 4.0 | | 4.0 | 4.0 | |
| High Level Input Voltage | V_{IH} | $R_L=10k\Omega$ $SW=V_{DD}$ $V_{EE}=V_{SS}$ | $V_o=4.0V$ | 5 | 3.5 | | 3.5 | | 3.5 | V |
| | | | $V_o=9.0V$ | 10 | 7.0 | | 7.0 | | 7.0 | |
| | | | $V_o=13.5V$ | 15 | 11.0 | | 11.0 | | 11.0 | |
| Input Current | $\pm I_{IN}$ | $V_{IN}=0$ or 18V | 18 | | ± 0.1 | | ± 0.1 | | ± 1 | μA |

■ SWITCHING CHARACTERISTICS

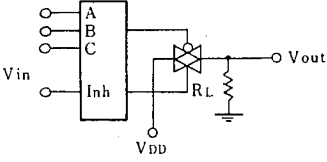
 ($T_a=25^{\circ}\text{C}$, $C_L=50\text{pF}$)

| PARAMETER | | SYMBOL | CONDITIONS | $V_{DD}(V)$ | MIN | TYP | MAX | UNIT |
|---------------------------|----------------------|-----------------|---|-------------|------|------|-----|------|
| Propagation Delay Time | SW Input to Output | t_{PLH} | $R_L=10k\Omega$ | 5 | 15 | 45 | ns | |
| | | | | 10 | 8 | 30 | | |
| | | | | 15 | 5 | 20 | | |
| | CONT Input to Output | t_{PHL} | | 5 | 15 | 45 | | |
| | | | | 10 | 8 | 30 | | |
| | | | | 15 | 5 | 20 | | |
| | t_{PZH} | 5 | 450 | 1000 | ns | | | |
| | | 10 | 200 | 500 | | | | |
| | | 15 | 150 | 400 | | | | |
| Output Enable Time | t_{PHZ} | $R_L=10k\Omega$ | 5 | 600 | | 1400 | ns | |
| | | | 10 | 250 | | 700 | | |
| | | | 15 | 200 | | 500 | | |
| Output Disable Time | t_{PLZ} | | 5 | 600 | 1400 | ns | | |
| | | | 10 | 250 | 700 | | | |
| | | | 15 | 200 | 500 | | | |
| Sine-Wave Distortion | | | $R_L=10k\Omega$, $f=1\text{kHz}$, $V_{IS}=5V_{P-P}$ | 10 | 0.05 | | % | |
| Feedthrough (all-ch. off) | | | $R_L=1k\Omega$, $20\log_{10}V_{os}/V_{IS}=-50\text{dB}$ | 10 | 4.5 | | MHz | |
| Crosstalk | SW A to B | | $R_L=1k\Omega$, $V_{IS}=1/2(V_{DD}-V_{SS})_{P-P}$ | 10 | 3.0 | | MHz | |
| | Control-Out | | $R_I=1k\Omega$, $R_L=10k\Omega$, $t_r=t_f=20\text{ns}$ CONTROL/INHIBIT | 10 | 30 | | mV | |

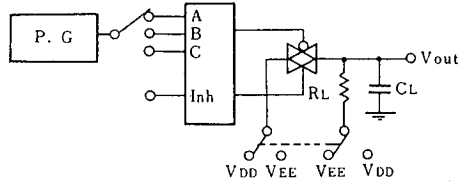
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MEASUREMENT CIRCUITS

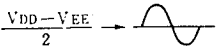
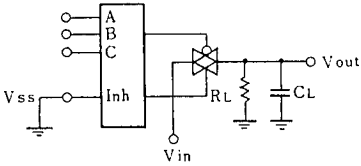
1. Noise Margin



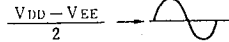
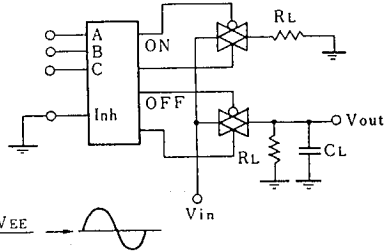
2. Propagation Delay



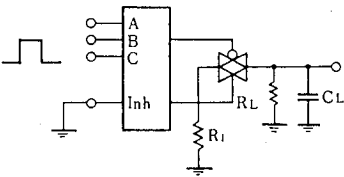
3. Feedthrough



4. Crosstalk (Switch A and B)



5. Crosstalk (Control and Out)



MEMO

[CAUTION]

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