

TRIPLE 2-CHANNEL MULTIPLEXER

■ GENERAL DESCRIPTION

The NJU4053B is a triple 2-channel multiplexer with three independent control inputs and an inhibit input.

The three control input signals select 1 of a pair of channels to be turned on and connect them to the three 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 CD4053B and Motorola MC14053B.

■ PACKAGE OUTLINE



NJU4053BD



NJU4053BM



NJU4053BV

■ 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 --- 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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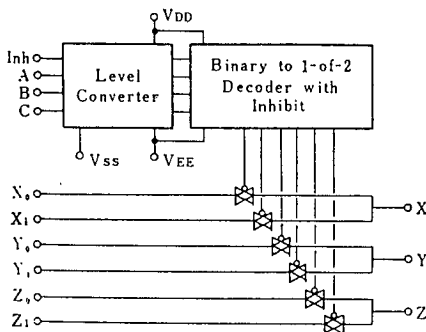
■ EQUIVALENT CIRCUIT



■ PIN CONFIGURATION



■ BLOCK DIAGRAM



■ TRUTH TABLE

| INH | C | B | A | On Switch | | |
|-----|---|---|---|----------------|----------------|----------------|
| 0 | 0 | 0 | 0 | Z ₀ | Y ₀ | X ₀ |
| 0 | 0 | 0 | 1 | Z ₀ | Y ₀ | X ₁ |
| 0 | 0 | 1 | 0 | Z ₀ | Y ₁ | X ₀ |
| 0 | 0 | 1 | 1 | Z ₀ | Y ₁ | X ₁ |
| 0 | 1 | 0 | 0 | Z ₁ | Y ₀ | X ₀ |
| 0 | 1 | 0 | 1 | Z ₁ | Y ₀ | X ₁ |
| 0 | 1 | 1 | 0 | Z ₁ | Y ₁ | X ₀ |
| 0 | 1 | 1 | 1 | Z ₁ | Y ₁ | X ₁ |
| 1 | x | 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 | T_{opr} | - 40 ~ + 85 | °C |
| Storage Temperature Range | T_{stg} | - 65 ~ + 150 | °C |

■ 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 10 15 20 | 5 10 20 100 | | 5 10 20 100 | | 150 300 600 3000 | μA | |
| On-State Resistance | R_{ON} | $0 \leq V_{is} \leq V_{DD}$ $V_{EE}=V_{SS}=0V$ | 5 10 15 | 500 210 140 | | 220 100 60 | 600 250 160 | 800 300 200 | Ω | |
| On-State Resistance Deviation | ΔR_{ON} | Between 2 channels $V_{EE}=V_{SS}=0V$ | 5 10 15 | | | 15 10 5 | | | Ω | |
| 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 10 | 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 $V_o=1.0V$ 10 $V_o=1.5V$ 15 | 1.5 3.0 4.0 | | 1.5 3.0 4.0 | | 1.5 3.0 4.0 | V | |
| High Level Input Voltage | V_{IH} | $V_{EE}=V_{SS}$ | $V_o=4.0V$ 5 $V_o=9.0V$ 10 $V_o=13.5V$ 15 | 3.5 7.0 11.0 | | 3.5 7.0 11.0 | | 3.5 7.0 11.0 | V | |
| Input Current | $\pm I_{IN}$ | $V_{IN}=0$ or 18V | 18 | ±0.1 | | ±0.1 | | ± 1 | μA | |

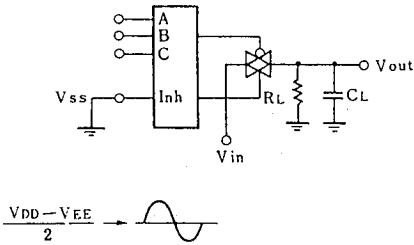
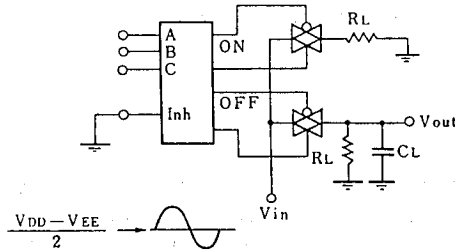
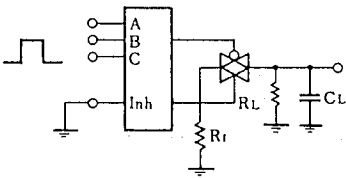
■ SWITCHING CHARACTERISTICS

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

| PARAMETER | | SYMBOL | CONDITIONS | $V_{DD}(\text{V})$ | MIN | TYP | MAX | UNIT |
|---------------------------|----------------------|------------------------|---|--------------------|------|------|-----|------|
| Propagation Delay Time | SW Input to Output | t_{PLH} | $R_L=10\text{k}\Omega$ | 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} | $R_L=10\text{k}\Omega$ | 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 | | | $R_L=10\text{k}\Omega$, $f=1\text{kHz}$, $V_{IS}=5V_{P-P}$ | 10 | 0.05 | | | % |
| Feedthrough (all-ch. off) | | | $R_L=1\text{k}\Omega$, $20\log_{10}V_{OS}/V_{IS}=-50\text{dB}$ | 10 | 4.5 | | | MHz |
| Crosstalk | SW A to B | | $R_L=1\text{k}\Omega$, $V_{IS}=1/2(V_{DD}-V_{SS})_{P-P}$ | 10 | 3.0 | | | MHz |
| | Control-Out | | $R_L=1\text{k}\Omega$, $R_L=10\text{k}\Omega$, $t_r=t_f=20\text{ns}$ CONTROL/INHIBIT | 10 | 30 | | mV | |

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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