



3·1/2 DIGIT SINGLE CHIP A/D CONVERTER WITH DISPLAY HOLD

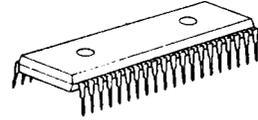
■ GENERAL DESCRIPTION

The NJU9203B/9204B are low-power-consumption, high-performance 3·1/2 digit single chip A/D converters with display hold containing a voltage reference, oscillator, 3·1/2 digits A/D converter, 7-segment decoder, display driver and control circuits.

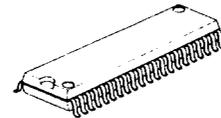
The NJU9203B is designed for direct LCD driving and the NJU9204B for LED direct driving.

The NJU9203B/9204B can be operated on simple application circuits as they require only few external components, therefore they are most suited for digital multimeter, digital thermometer and other likes.

■ PACKAGE OUTLINE



NJU9203BD/9204BD

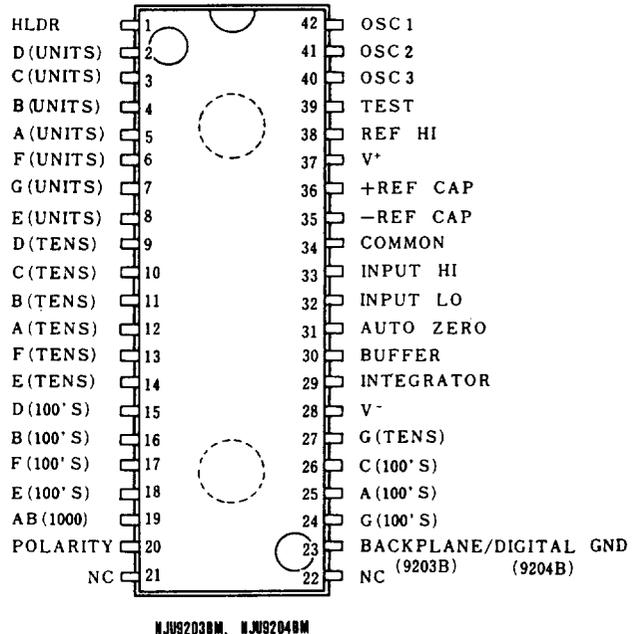
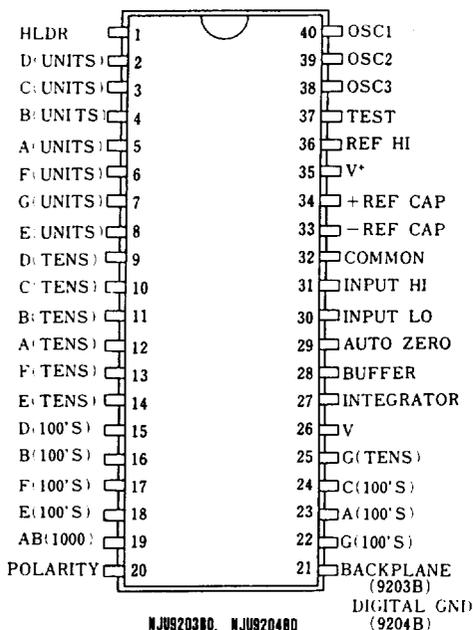


NJU9203BM/9204BM

■ FEATURES

- Display Hold Function
- Guaranteed 0 reading for 0 input on all scales
- Polarity detection at 0 point
using a high-accuracy null-detection
- Low Input Current -- 1pA typ.
- True differential input
- Display device direct driving
 NJU9203B -- LCD
 NJU9204B -- LED
- Reference and Oscillation Circuits incorporated
- Low power consumption
- No external active components required
- Package Outline -- DIP 40 /DMP 42
- C-MOS Technology

■ PIN CONFIGURATION




■ ABSOLUTE MAXIMUM RATINGS

(Ta=25°C)

| PARAMETER | DEVICE | SYMBOL | RATINGS | UNIT |
|-----------------------------|-------------|-------------|-----------------|------|
| Supply Voltage | 9203B Only | $V^+ - V^-$ | 15 | V |
| | 9204B Only | V^+ | +6 | |
| | 9204B Only | V^- | -9 | |
| Analog Input Voltage | 9203B/9204B | V_{IN} | $V^+ \sim V^-$ | V |
| Reference Input Voltage | 9203B/9204B | V_{ref} | $V^+ \sim V^-$ | V |
| Clock Input | 9203B Only | V_{CLK} | Test $\sim V^+$ | V |
| | 9204B Only | | GND $\sim V^+$ | |
| Power Dissipation | 9203B/9204B | P_D | 300 / 800 | mW |
| Operating Temperature Range | 9203B/9204B | T_{OPF} | 0 ~ +75 | °C |
| Storage Temperature Range | 9203B/9204B | T_{STG} | -40 ~ +125 | °C |

 Note 1) The input current is limit by $\pm 100\mu A$ when the input voltage is over supply voltage.

■ ELECTRICAL CHARACTERISTICS

 (Ta=25°C, $f_{clock}=48kHz$)

| PARAMETER | SYMBOL | CONDITIONS | MIN | TYP | MAX | UNIT |
|------------------------------|-----------|--|----------------|-------------|--------|------------------|
| Zero Input Reading | No | $V_{IN}=0.0V, FS=200.0mV$ | -000.0 | ± 000.0 | +000.0 | Counts |
| Ratiometric Reading | N1000 | $V_{IN}=V_{ref}, V_{ref}=100mV$ | 999 | 999/1000 | 1000 | |
| Rollover Error | Err | $-V_{IN}=+V_{IN}-200.0mV$ | -2 | ± 0.5 | +2 | Counts |
| Linearity | Lin | Full Scale=200mV | -2 | ± 0.5 | +2 | Counts |
| Common Mode Rejection Ratio | C_{MRR} | $V_{cm}=\pm 1V, V_{IN}=0V,$ Full Scale=200.0mV | | 50 | | $\mu V/V$ |
| Noise(P-P Value) | V_{NI} | $V_{IN}=0V, FS=200.0mV$ | | 30 | | μV |
| Leakage Current | I_L | $V_{IN}=0V$ | | 1 | 10 | μA |
| Zero Reading Drift | Z_D | $V_{IN}=0V, 0 < T_a < 75^\circ C$ | | 0.2 | 1 | $\mu V/^\circ C$ |
| Scale Factor Temp. Coeff. | Ftemp | $V_{IN}=199.0mV, 0 < T_a < 75^\circ C$ | | 1 | 5 | ppm/°C |
| Operating Current | I_{DD} | $V_{IN}=0V, No Load$ | | 0.8 | 1.8 | mA |
| Analog Common Voltage | | 25k Ω Between Common and Positive Supply | 2.4 | 3.0 | 3.2 | V |
| Temp. Coeff.of Analog Common | | | | 80 | | |
| Seg. Drive Voltage (9203B) | | $V_{DD}=9V$ | 4 | 5 | 6 | V |
| BackPlane Drive Volt.(9203B) | | $V_{DD}=9V$ | 4 | 5 | 6 | |
| Seg. Sinking Current (9204B) | | $V_{DD}=5V,$ Seg.V=3V | Except Term.19 | 5.0 | 8.0 | mA |
| Seg. Sinking Current (9204B) | | | Term.19 only | 10 | 16 | |

Note 2) Differential read out value of positive and negative voltage input.

3) Error from the input-output linear characteristics getting from positive and negative full-scale input read out.

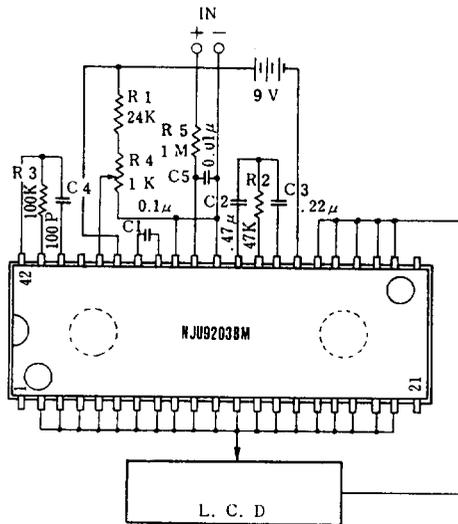
4) The peak value of noise must be not over 95% period in the measurement time.

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■ APPLICATION CIRCUITS

NJU9203B



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NJU9204B

