

### 3·1/2 DIGIT SINGLE CHIP A/D CONVERTER

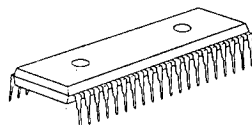
#### ■ GENERAL DESCRIPTION

The NJU9201B/9202B are low-power-consumption, high-performance 3·1/2 digit single chip A/D converters containing a voltage reference, oscillator, 3·1/2 digit A/D converter, 7-segment decoder, display driver and control circuits.

The NJU9201B is designed for direct LCD driving and the NJU9202B for direct LED driving.

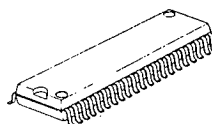
The NJU9201B/9202B can be operated on simple application circuits as they require only few external components, therefore they are most suited for digital multimeters, digital thermometers and other likes.

#### ■ PACKAGE OUTLINE



NJU9201BD/9202BD

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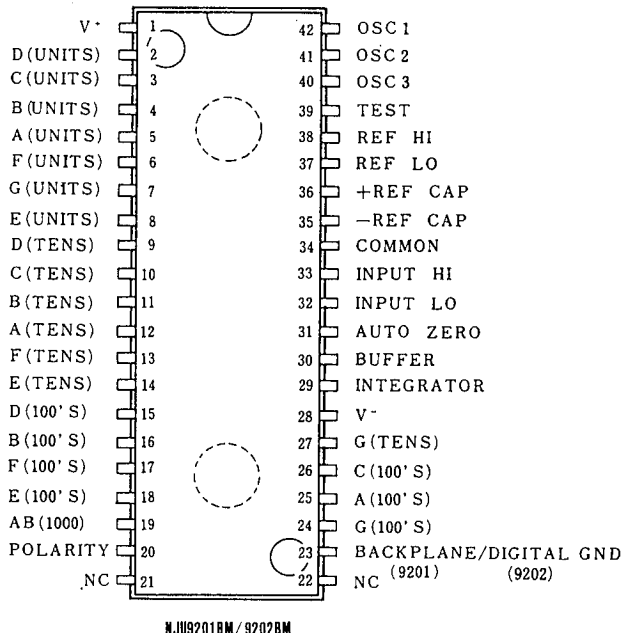
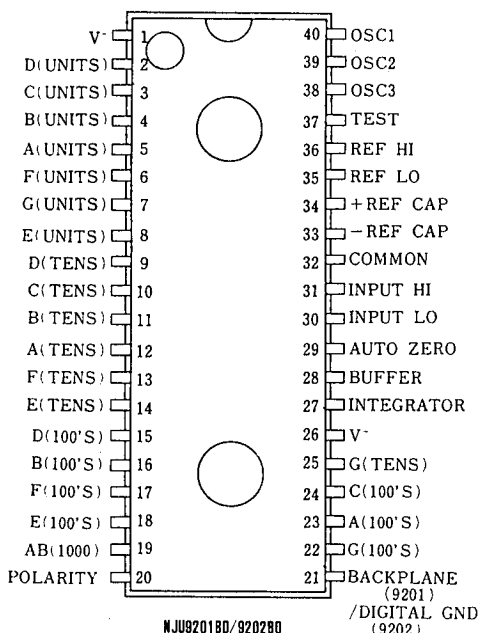


NJU9201BM/9202BM

#### ■ FEATURES

- 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 and reference
- Display device direct driving
  - NJU9201B -- LCD
  - NJU9202B -- 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	9201B Only	$V^+ - V^-$	15	V
	9202B Only	$V^+$	+6	
	9202B Only	$V^-$	-9	
Analog Input Voltage	9201B/9202B	$V_{IN}$	$V^+ \sim V^-$	V
Reference Input Voltage	9201B/9202B	Vref	$V^+ \sim V^-$	V
Clock Input	9201B Only 9202B Only	$V_{CLK}$	Test $\sim V^+$ GND $\sim V^+$	V
Power Dissipation	9201B/9202B	$P_D$	300 / 800	mW
Operating Temperature Range	9201B/9202B	$T_{OPR}$	0 ~ +75	°C
Storage Temperature Range	9201B/9202B	$T_{STG}$	-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	$\pm 000.0$	+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)	-2	$\pm 0.5$	+2	Counts
Linearity	Lin	Full Scale=200mV (3)	-2	$\pm 0.5$	+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)	$V_{NI}$	$V_{IN}=0V, FS=200.0mV$ (4)		30		$\mu V$
Leakage Current	$I_L$	$V_{IN}=0V$		1	10	$\mu A$
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 $\Omega$ Between Common and	2.4	3.0	3.2	V
Temp. Coeff.of Analog Common		Positive Supply		80		
Seg. Drive Voltage (9201B)		$V_{DD}=9V$	4	5	6	V
BackPlane Drive Volt.(9201B)		$V_{DD}=9V$	4	5	6	
Seg. Sinking Current (9202B)		$V_{DD}=5V,$ Except Term.19	5.0	8.0		mA
Seg. Sinking Current (9202B)		Seg.V=3V Term.19 only	10	16		

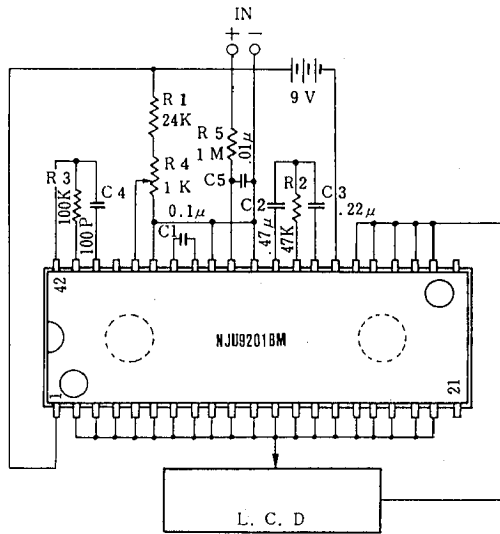
Note 2) Differential read out value of positive and negative voltage input.

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.

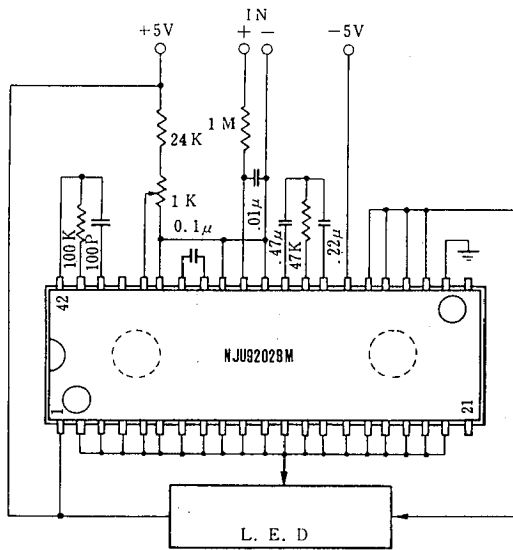
APPLICATION CIRCUITS

NJU9201B



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NJU9202B



## MEMO

[CAUTION]

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