

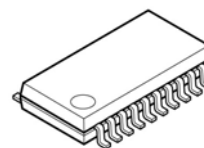
## 2-DIGIT SINGLE CHIP A/D CONVERTER

### ■GENERAL DESCRIPTION

The **NJU9252P** is a low operating current, high performance 2-digit single chip A/D converter containing a sample/hold circuit, an oscillator, a 7-segment decoder, LED display driver and a control circuit. The LED display changes by the high-speed sampling rate of 4 times/s (typ).

The **NJU9252P** realizes to apply with few external components, therefore it is most suited for digital meters, digital thermometers and the others.

### ■PACKAGE OUTLINE

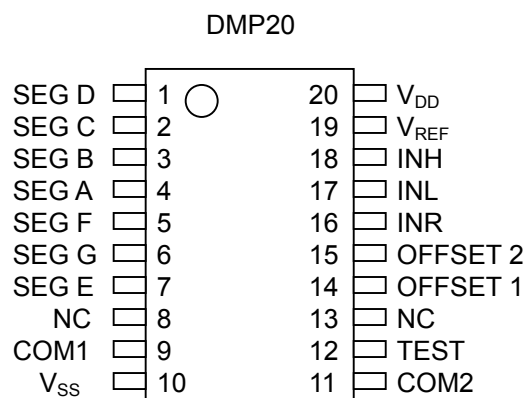


**NJU9252PM**

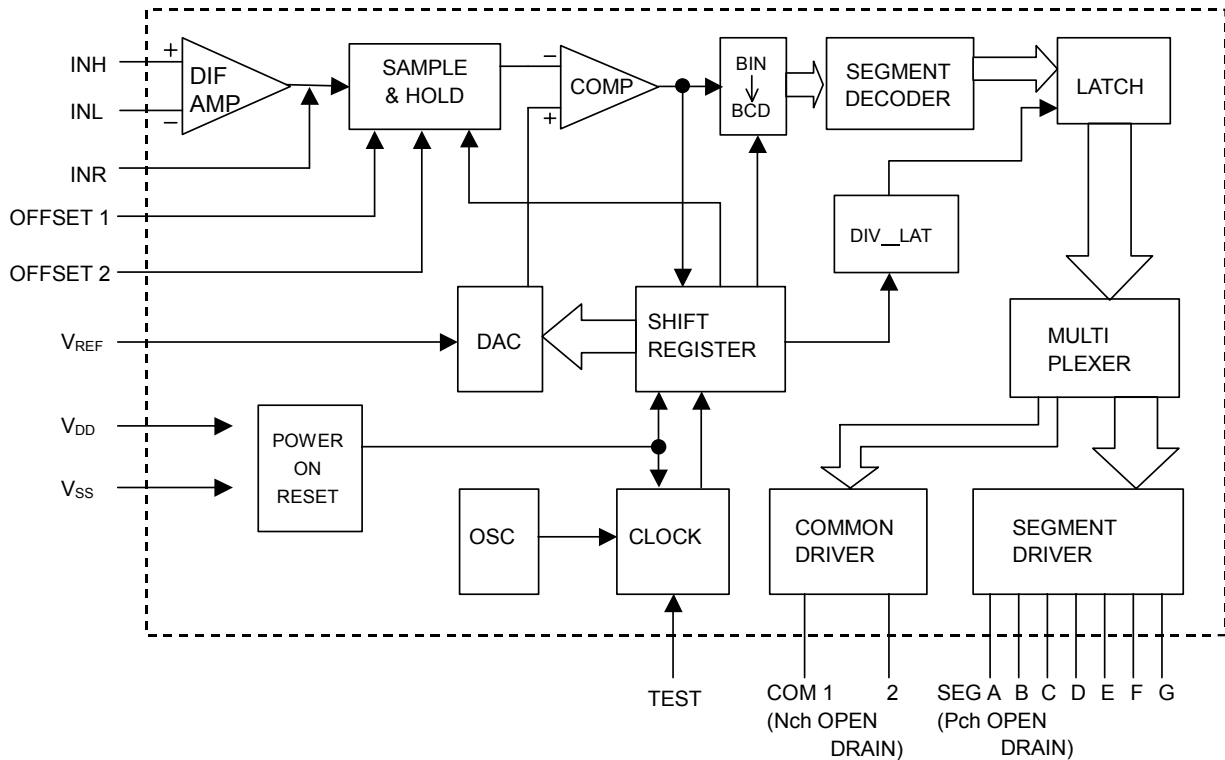
### ■FEATURES

- 8bit Resolution, Successive Approximation Method
- Low Input Current ( 1 $\mu$ A typ )
- Dynamic LED direct drive
- Sampling-rate ( 4 times/s typ )
- Sample/Hold Circuit On-Die
- CR Oscillation Circuit On-Die
- Power-on Initialization
- Offset Adjustment Terminal
- Low operating current
- Applicable with Few External Components
- C-MOS technology
- Package DMP20

### ■PAD LOCATION



## ■BLOCK DIAGRAM



## ■TERMINAL DESCRIPTION

SYMBOL	FUNCTION
SEG D	LED Segment Driver D output ( Pch open-drain )
SEG C	LED Segment Driver C output ( Pch open-drain )
SEG B	LED Segment Driver B output ( Pch open-drain )
SEG A	LED Segment Driver A output ( Pch open-drain )
SEG F	LED Segment Driver F output ( Pch open-drain )
SEG G	LED Segment Driver G output ( Pch open-drain )
SEG E	LED Segment Driver E output ( Pch open-drain )
COM1	LED Common Driver output 1 ( Nch open-drain )
V <sub>SS</sub>	GND
COM2	LED Common Driver output 2 ( Nch open-drain )
TEST	Test Terminal
OFFSET 1	Offset Adjustment Terminal 1
OFFSET 2	Offset Adjustment Terminal 2
INR	Input Gain setup Resistor Connecting Terminal
INL	Analog Differential Input ( Lo )
INH	Analog Differential Input ( Hi )
V <sub>REF</sub>	Reference Voltage
V <sub>DD</sub>	Supply Voltage
NC	Non Connection

**■ABSOLUTE MAXIMUM RATINGS**

(Ta=25°C)

PARAMETER	SYMBOL	RATING	UNIT
Supply Voltage	V <sub>DD</sub>	-0.3 to +7.0	V
Analog Input Voltage	V <sub>IN</sub>	GND to V <sub>REF</sub>	V
Reference Input Voltage	V <sub>REF</sub>	GND to V <sub>DD</sub>	V
Power Dissipation	P <sub>D</sub>	500	mW
Operating Temperature Range	Topr	-20 to +75	°C
Storage Temperature Range	Tstg	-40 to +125	°C

Note1) The input current is limited to ±100μA when the input voltage is more than supply voltage.

**■ELECTRICAL CHARACTERISTICS**

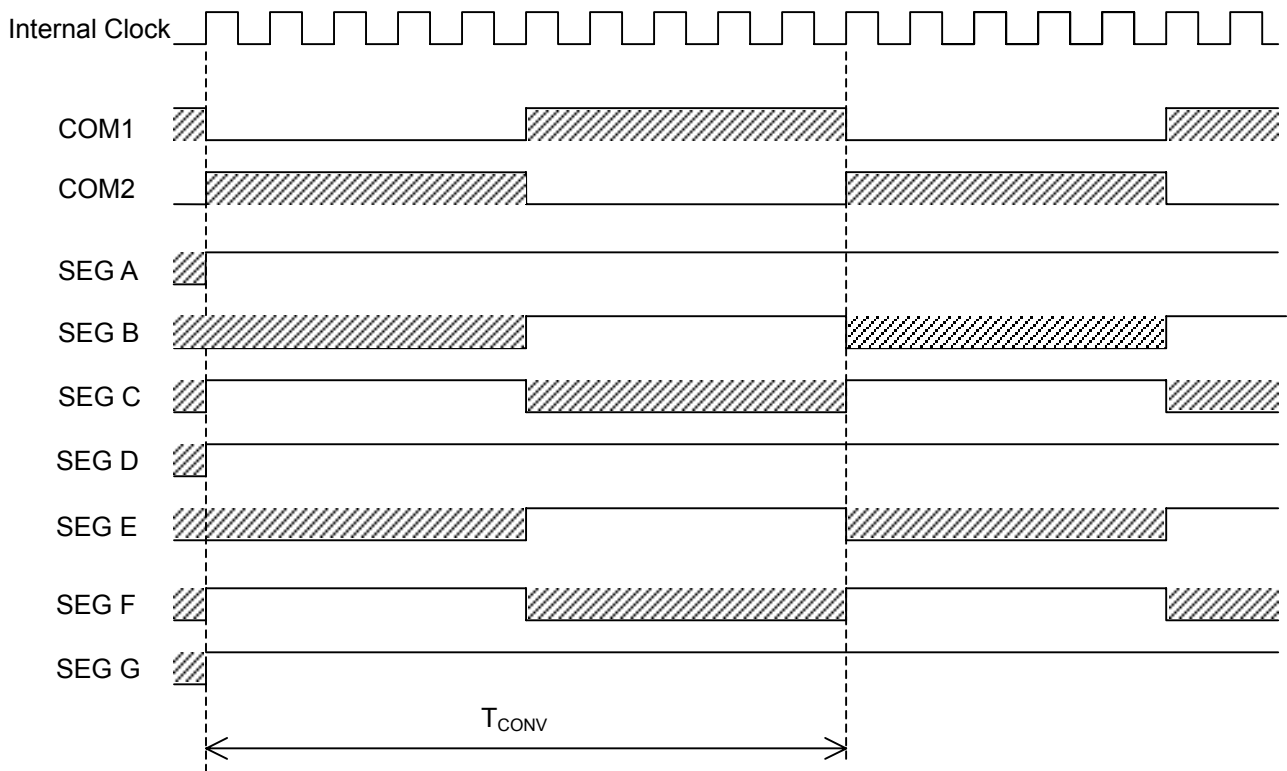
 (V<sub>DD</sub>=5V, Ta=25°C)


PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNIT
Operating Voltage	V <sub>DD</sub>		4.5	5.0	5.5	V
Ratiometric Reading	N99	V <sub>IN</sub> =2.475V, V <sub>REF</sub> =3.2V	98	98/99	99	Counts
Linearity	D <sub>L</sub>	Full Scale=2.475V Note2)		±0.5	±2	LSB
Offset	E <sub>OFF</sub>	V <sub>REF</sub> =3.2V		±1	±2	LSB
Noise ( P-P Value )	V <sub>NI</sub>	V <sub>IN</sub> =0.0V Full Scale=2.475V Note3)		30		μV
Leakage Current	I <sub>L</sub>	V <sub>IN</sub> =0.0V		1	5	μA
Zero Reading Drift	Z <sub>D</sub>	V <sub>IN</sub> =0.0V, V <sub>REF</sub> =3.2V, -20<Ta<+75°C		0.2	1	μV/°C
Scale Factor Temperature Coefficient	Ftemp	V <sub>IN</sub> =2.475V, V <sub>REF</sub> =3.2V, -20<Ta<+75°C (Ext.ref, 0ppm/°C)		1	5	ppm /°C
Sampling-rate	Ts		3	4	5	times/s
Operating Current	I <sub>DD</sub>	V <sub>IN</sub> =0.0V		0.8	1.8	mA
Segment Sink Current	I <sub>S1</sub>	Segment Voltage=3V SEG A to SEG G Terminals	10	14		mA
	I <sub>S2</sub>	Segment Voltage=3V COM1, COM2 Terminals	70	98		mA

Note2) Linearity indicates an error of the input-output linearity characteristics getting with the two read data of zero and full scale input values.

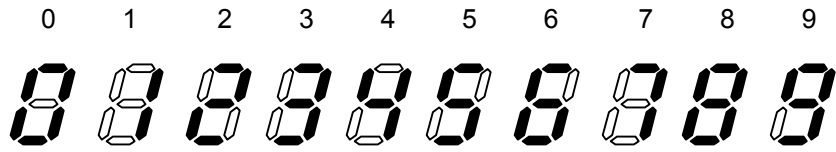
Note3) The peak value of noise must be kept within this value during 95% period in the measurement time.

## ■TIMING CHART



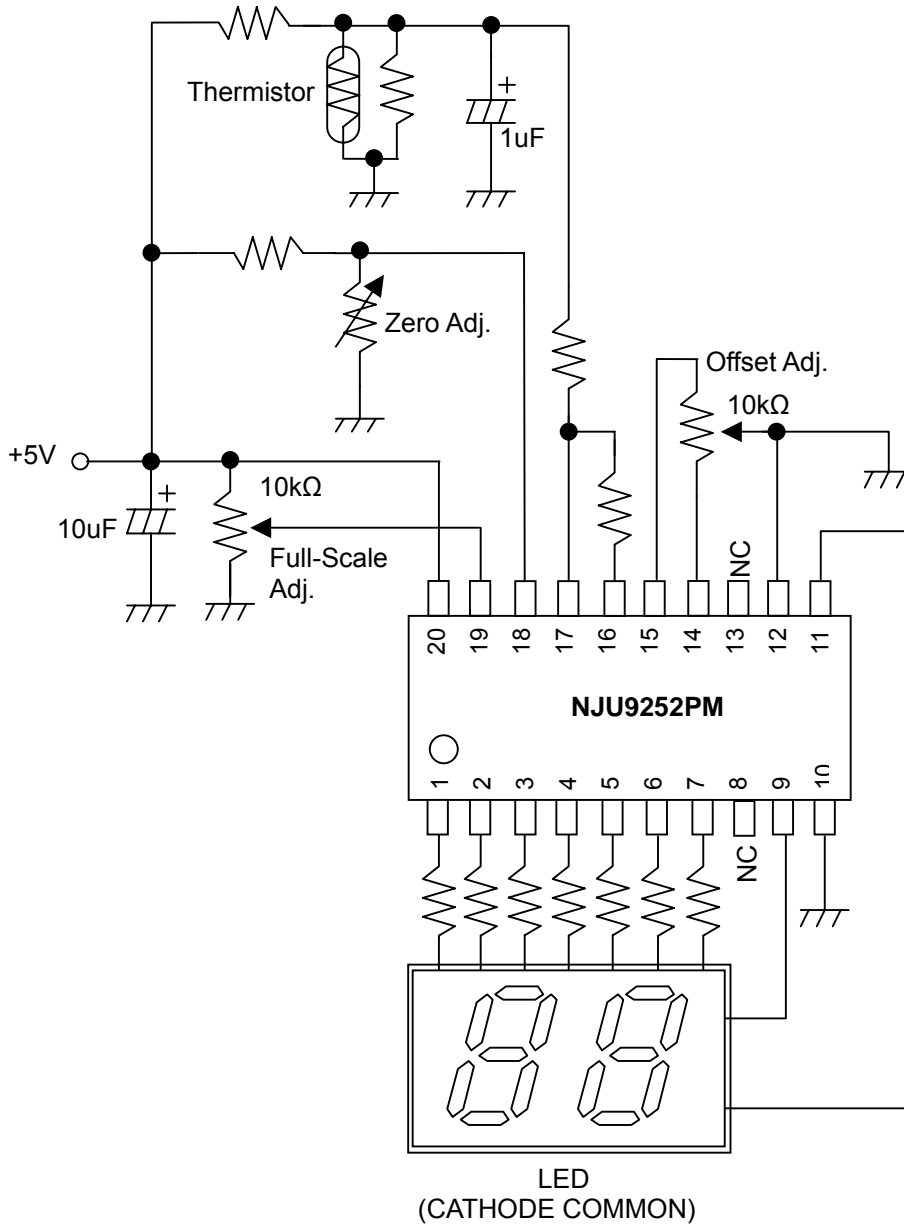
Note4) SEG A to SEG G are an example to display "25".  
 The duty of COM1 and COM2 are 50% respectively.  
 COM1 and COM2 are Nch-FET open-drain type, SEG A to SEG G are Pch-FET open-drain type.  
 : The state of Output Terminal is high impedance.

■ DISPLAY PATTERN



■ APPLICATION CIRCUIT ( Ex. NJU9252PM)

● Thermometer



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