

# AN8122K

## High Speed Low Power Consumption 8-Bit A/D Converter

### Overview

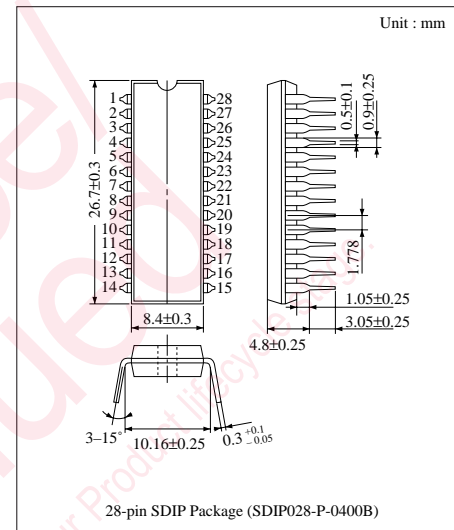
The AN8122K is a 8-bit A/D converter for image processing which uses the high speed bipolar process, realizing the low power consumption and the analogue input band of 60MHz. It can operate with single power supply of 5V and maximum conversion rate of 50MSPS.

### Features

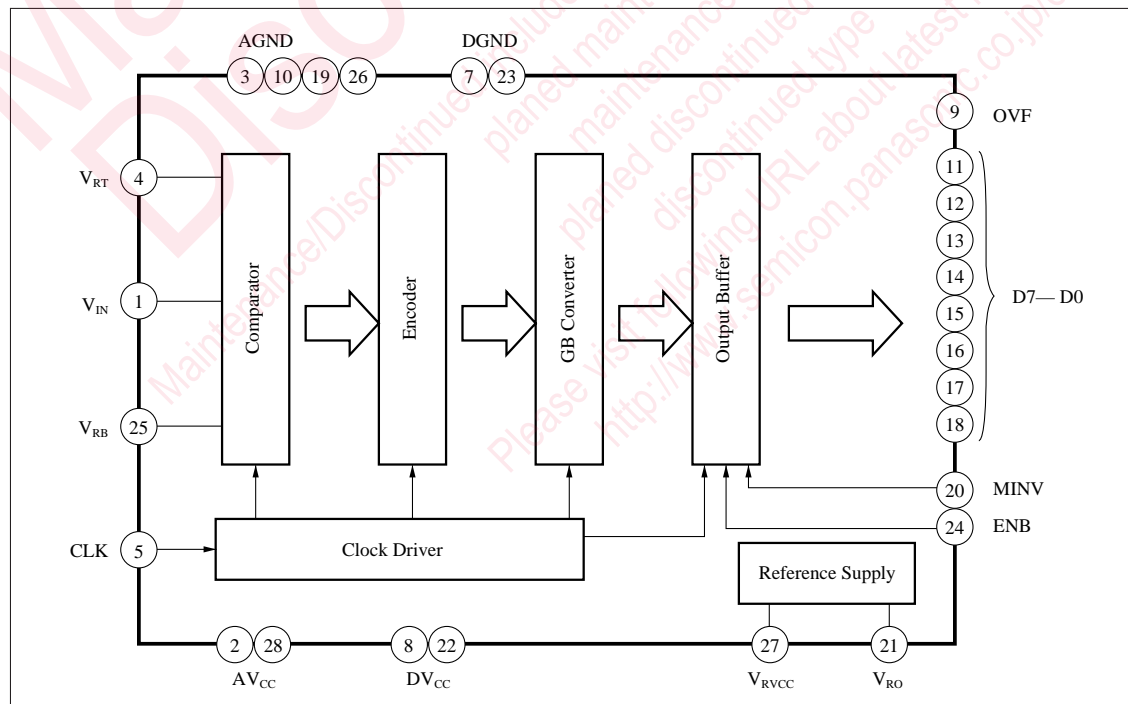
- 8-bit resolution
- Maximum conversion rate : 50MSPS(min.)
- Wide input band : 60MHz, typ.(-3dB)
- Low power consumption : 150mW(typ.)
- Operation on single power supply of 5V
- Low input capacitance : 15pF
- Input/Output form : TTL level compatible

### Application Field

- Image processing
- Measuring equipment such as digital oscilloscope



### Block Diagram



## ■ Absolute Maximum Ratings (Ta=25°C)

Parameter	Symbol	Rating	Unit
Supply voltage	V <sub>CC</sub>	- 0.3 to + 6.0	V
Analogue input voltage	V <sub>IN</sub>	0 to V <sub>CC</sub> + 0.3	V
Digital input voltage	V <sub>CLK</sub> /MINV/ENB	- 0.3 to V <sub>CC</sub> + 0.3	V
Digital output current	I <sub>D7</sub> to I <sub>D0/OVF</sub>	-15	mA
Reference resistive current	I <sub>RT</sub> /I <sub>RB</sub>	+ 50/-50	mA
Reference voltage	V <sub>RT</sub> /V <sub>RB</sub>	0 to V <sub>CC</sub> + 0.3	V
Power dissipation	P <sub>D</sub>	1050*	mW
Operating ambient temperature	T <sub>opr</sub>	-20 to + 75	°C
Storage temperature	T <sub>stg</sub>	-55 to + 150	°C

\* Ta=75°C

## ■ Recommended Operating Conditions (Ta=25°C)

Parameter	Symbol	min	typ	max	Unit
Supply voltage	V <sub>CC</sub>	4.75	5.0	5.25	V
Reference voltage	V <sub>RT</sub>	—	5.0	—	V
	V <sub>RB</sub>	—	3.0	—	V
Analogue input voltage	V <sub>IN</sub>	V <sub>RB</sub>	—	V <sub>RT</sub>	V
Digital input voltage	V <sub>IH</sub>	2.0	—	—	V
	V <sub>IL</sub>	—	—	0.8	V
Clock input pulse width *	t <sub>H</sub>	—	14	—	ns

\* f<sub>CLK</sub>=35MHz

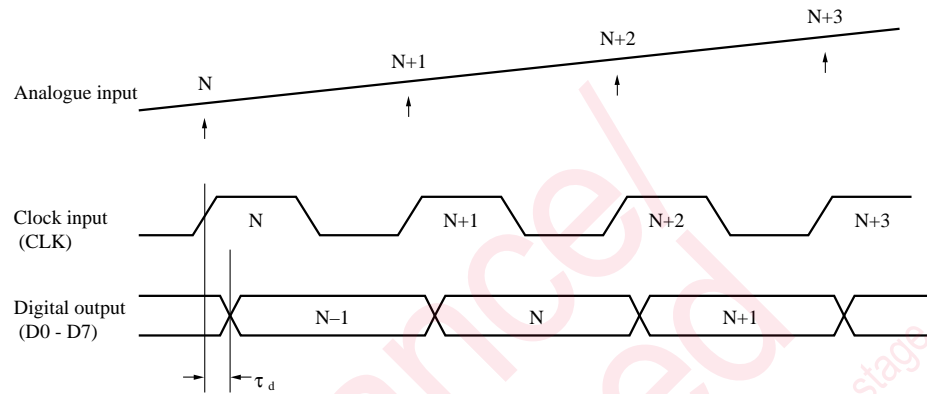
## ■ Electrical Characteristics (V<sub>CC</sub>=5V, Ta=25°C)

Parameter	Symbol	Condition	min	typ	max	Unit
Supply current	I <sub>CC</sub>		—	30	50	mA
Reference power supply output voltage	V <sub>RO</sub>	I <sub>RO</sub> =10mA, V <sub>RVCC</sub> =5.0V	2.8	3.0	3.2	V
Reference supply current	I <sub>RVCC</sub>	Reference power supply output under no Load	—	2.0	—	mA
Reference resistive current	I <sub>RT</sub>	V <sub>RT</sub> =5.0V	—	9	20	mA
	I <sub>RB</sub>	V <sub>RB</sub> =3.0V	-20	-9	—	mA
Input bias current	I <sub>IN</sub>	V <sub>IN</sub> =4.0V	—	40	120	μA
Digital input current	I <sub>IH</sub>	V <sub>IH</sub> =2.7V	—	100	145	μA
	I <sub>IL</sub>	V <sub>IL</sub> =0.4V	-145	-100	—	μA
Digital output voltage	V <sub>OH</sub>	I <sub>OH</sub> =-400μA	2.7	3.4	—	V
	V <sub>OL</sub>	I <sub>OL</sub> =1.6mA	—	0.2	0.4	V
Linearity error	E <sub>L</sub>	V <sub>RT</sub> -V <sub>RB</sub> =2.0V	—	±0.25	±0.65	LSB
Differential linearity error	E <sub>D</sub>	V <sub>RT</sub> -V <sub>RB</sub> =2.0V	—	±0.25	±0.65	LSB
Maximum conversion rate	F <sub>C</sub> MAX		50	—	—	MHz
Maximum conversion rate			—	2	—	V <sub>P-P</sub>
Equivalent input impedance *1	R <sub>IN</sub>	V <sub>IN</sub> =4V	—	50	—	kΩ
Input capacitance *1	C <sub>IN</sub>	V <sub>IN</sub> =4V	—	15	—	pF
Quantization noise *2	SINAD	f <sub>CLK</sub> =35MHz, f <sub>IN</sub> =5MHz	—	45	—	dB
		f <sub>CLK</sub> =35MHz, f <sub>IN</sub> =10MHz	—	43	—	dB
Input band *1	BW <sub>F</sub>	V <sub>IN</sub> =2V <sub>P-P</sub> , -3dB	—	60	—	MHz
Clock duty *1	DTY	f <sub>CLK</sub> =50MHz	—	50	—	%
Digital output delay *1	τ <sub>d</sub>		—	20	—	ns

\*1 Design reference value but not guaranteed one

\*2 Total harmonics distortion included

## ■ Timing Chart



## ■ Output Code

Step	Input signal			Digital output			
	2.000VFS	7.810mV	STEP	MINV=L		MINV=H	
				M	L	M	L
			OVF	76543210	OVF	76543210	
000	3.00000			0 00000000		0 10000000	
001	3.00781			0 00000001		0 10000001	
.	.			.		.	
.	.			.		.	
127	3.99218			0 01111111		0 11111111	
128	4.00000			0 10000000		0 00000000	
129	4.00781			0 10000001		0 00000001	
.	.			.		.	
.	.			.		.	
255	4.99218			0 11111111		0 01111111	
256	5.00000			1 11111111		1 01111111	

## ■ Pin Descriptions

Pin No.	Symbol	Pin name	Standard waveform	Voltage level	Description
1	VIN	Analogue input		3 to 5V	It is an input pin of analogue signal for A/D conversion circuit.
3, 10 19, 26	AGND	Analogue ground		0V	Connect AGND and DGND with the possible lowest impedance at one point as near as possible to the chip.
2 28	AVCC	Analogue power supply pin		5V	It is a power supply pin for analogue. Connect tantalum capacitor of several $\mu\text{F}$ and ceramic capacitor of $0.1\mu\text{F}$ as near as possible to this pin between this pin and AGND.
8 22	DVCC	Digital power supply pin		5V	It is a power supply pin for digital signal. Connect tantalum capacitor of several $\mu\text{F}$ and ceramic capacitor of $0.1\mu\text{F}$ as near as possible to this pin between this pin and DGND.
4 25	V <sub>RT</sub> V <sub>RB</sub>	Reference voltage high level, Reference voltage low level		5V 3V	It is used to set the reference voltage for comparator. Normally, V <sub>RT</sub> is given 5V and V <sub>RB</sub> is given 3V. Connect tantalum capacitor of several $\mu\text{F}$ and ceramic capacitor of $0.1\mu\text{F}$ in parallel between each pin and analogue ground.
7 23	DGND	Digital ground		0V	Connect AGND and DGND with the possible lowest impedance at one point as near as possible to the chip.
5	CLK	Clock input	Refer to the timing chart.	TTL	It is a clock for sampling. For their timing, refer to the timing chart.
9 11 12 13 14 15 16 17 18	OVF D7 D6 D5 D4 D3 D2 D1 D0	Overflow output, Digital output (LSB), Digital output, Digital output, Digital output, Digital output, Digital output, Digital output, Digital output (MSB)	Refer to the timing chart.	TTL	It is an output pin of TTL Level.
20	MINV	Output code setting pin	Refer to the output code table.	TTL	Setting the MINV pin to "H" level sets the digital output code to 2's complement code and setting it to "L" level sets the digital output code to binary code. The output is reversed synchronously with clock.
24	ENB	Output enabling pin		TTL	Setting the ENB pin to "H" level enters the digital output pins (D0 - D7) into high impedance mode and setting it to "L" level enters them into enabling mode in which the digital data is outputted.
21 27	V <sub>RO</sub> V <sub>RVCC</sub>	Reference voltage output, V <sub>CC</sub> pin for reference power supply		V <sub>CC</sub> -2.0V V <sub>CC</sub>	It is a power supply output pin for A/D reference voltage. It is V <sub>CC</sub> pin for reference power supply.

Pin No. 6 : NC

## Request for your special attention and precautions in using the technical information and semiconductors described in this book

- (1) If any of the products or technical information described in this book is to be exported or provided to non-residents, the laws and regulations of the exporting country, especially, those with regard to security export control, must be observed.
- (2) The technical information described in this book is intended only to show the main characteristics and application circuit examples of the products, and no license is granted under any intellectual property right or other right owned by our company or any other company. Therefore, no responsibility is assumed by our company as to the infringement upon any such right owned by any other company which may arise as a result of the use of technical information described in this book.
- (3) The products described in this book are intended to be used for standard applications or general electronic equipment (such as office equipment, communications equipment, measuring instruments and household appliances).  
Consult our sales staff in advance for information on the following applications:
  - Special applications (such as for airplanes, aerospace, automobiles, traffic control equipment, combustion equipment, life support systems and safety devices) in which exceptional quality and reliability are required, or if the failure or malfunction of the products may directly jeopardize life or harm the human body.
  - Any applications other than the standard applications intended.
- (4) The products and product specifications described in this book are subject to change without notice for modification and/or improvement. At the final stage of your design, purchasing, or use of the products, therefore, ask for the most up-to-date Product Standards in advance to make sure that the latest specifications satisfy your requirements.
- (5) When designing your equipment, comply with the range of absolute maximum rating and the guaranteed operating conditions (operating power supply voltage and operating environment etc.). Especially, please be careful not to exceed the range of absolute maximum rating on the transient state, such as power-on, power-off and mode-switching. Otherwise, we will not be liable for any defect which may arise later in your equipment.
  - Even when the products are used within the guaranteed values, take into the consideration of incidence of break down and failure mode, possible to occur to semiconductor products. Measures on the systems such as redundant design, arresting the spread of fire or preventing glitch are recommended in order to prevent physical injury, fire, social damages, for example, by using the products.
- (6) Comply with the instructions for use in order to prevent breakdown and characteristics change due to external factors (ESD, EOS, thermal stress and mechanical stress) at the time of handling, mounting or at customer's process. When using products for which damp-proof packing is required, satisfy the conditions, such as shelf life and the elapsed time since first opening the packages.
- (7) This book may be not reprinted or reproduced whether wholly or partially, without the prior written permission of Matsushita Electric Industrial Co., Ltd.



LittleDiode supplies new, hard to find or obsolete electronic components and semiconductors all over the world.

With over two million different components listed you are sure to find the part you need.

Feel free to visit us today at our online store:

**[LittleDiode.com](http://LittleDiode.com)**

Looking forward to providing you with the best possible service.