AN8122FAP

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

■ Overview

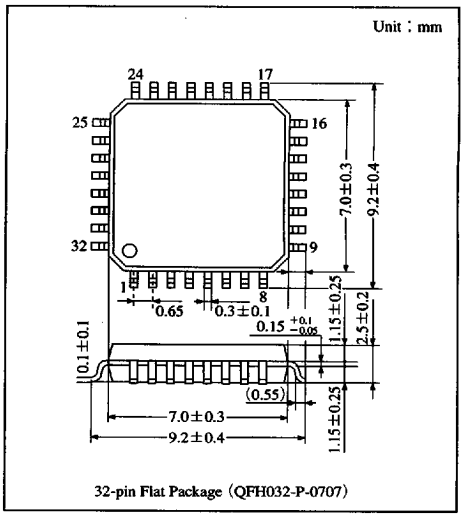
The AN8122FAP is a 8-bit A/D convertor for image processing which uses the high speed bipolar process, realizing the low power consumption and analogue input band of 60MHz. It can operate with single power supply of 5V and maximum conversion rate of 50MSPS.

■ 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

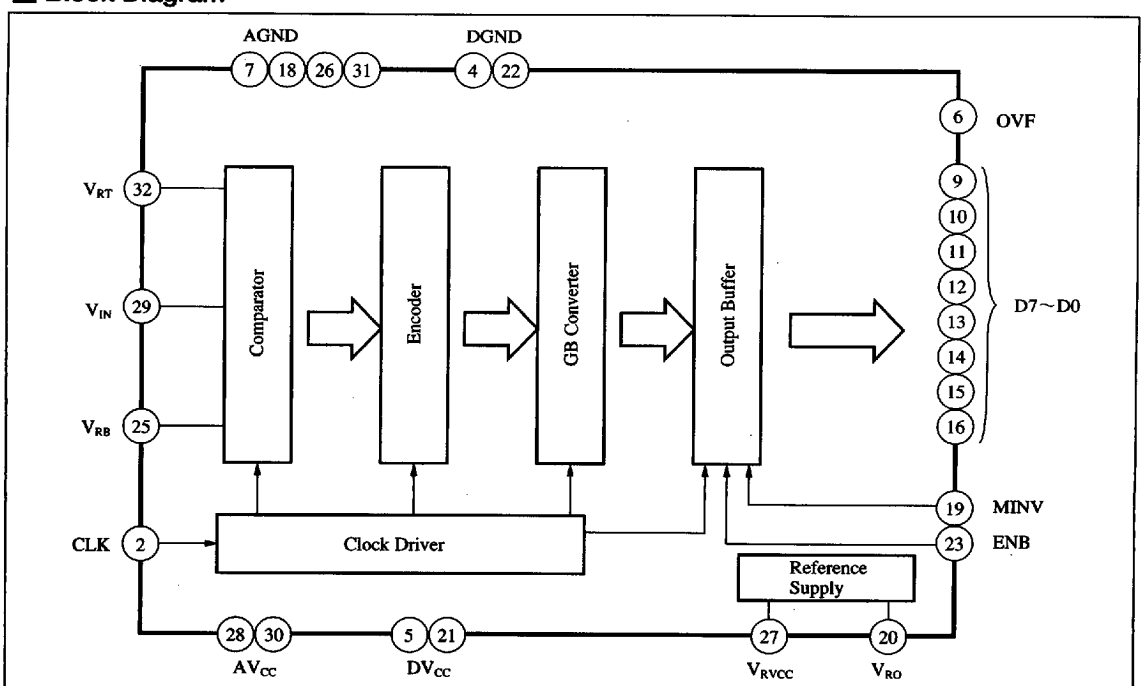
■ Application Field

- Image processing
- Measuring equipment such as digital oscilloscope



32-pin Flat Package (QFH032-P-0707)

■ Block Diagram



■ Absolute Maximum Ratings (Ta=25℃)

Parameter	Symbol	Rating	Unit
Supply voltage	V_{CC}	−0.3 to +6.0	V
Analogue input voltage	V_{IN}	0 to V_{CC}+0.3	V
Digital input voltage	V_{CLK}/MINV/ENB	−0.3 to V_{CC}+0.3	V
Digital output current	I_{D7} to $I_{D0/OVF}$	−15	mA
Reference resistive current	I_{RT}/I_{RB}	+50/−50	mA
Reference voltage	V_{RT}/V_{RB}	0 to V_{CC}+0.3	V
Power dissipation	P_D	334*	mW
Operating ambient temperature	T_{opr}	−20 to 75	℃
Storage temperature	T_{stg}	−55 to 150	℃

* Ta=75℃

■ Recommended Operating Conditions (Ta=25℃)

Parameter	Symbol	min	typ	max	Unit
Supply voltage	V_{CC}	4.75	5.0	5.25	V
Reference voltage	V_{RT}	—	5.0	—	V
	V_{RB}	—	3.0	—	V
Analogue input voltage	V_{IN}	V_{RB}	—	V_{RT}	V
Digital input voltage	V_{IH}	2.0	—	—	V
	V_{IL}	—	—	0.8	V
Clock input pulse width *	t_H	—	14	—	ns

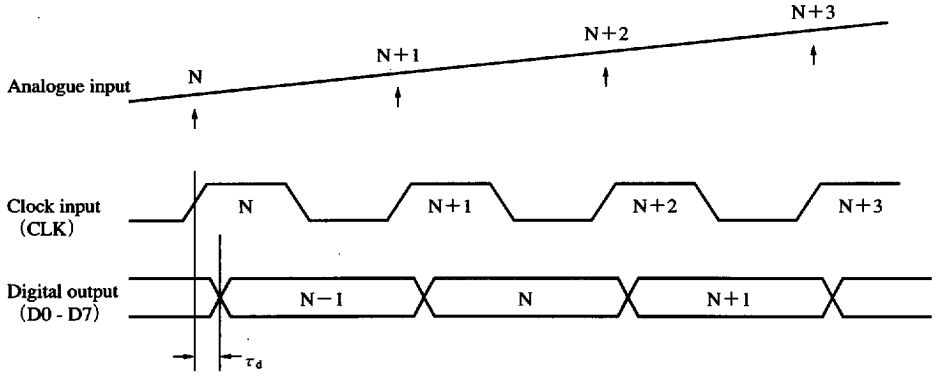
* f_{CLK}=35MHz

■ Electrical Characteristics (V_{CC}=5V, Ta=25℃)

Parameter	Symbol	Condition	min	typ	max	Unit
Supply current	I_{CC}		—	30	50	mA
Reference power supply output voltage	V_{RO}	I_{RO}=10mA, V_{RVCC}=5.0V	2.8	3.0	3.2	V
Reference supply current	I_{RVCC}	Reference power supply output under no Load	—	2.0	—	mA
Reference resistive current	I_{RT}	V_{RT}=5.0V	—	9	20	mA
	I_{RB}	V_{RB}=3.0V	−20	−9	—	mA
Input bias current	I_{IN}	V_{IN}=4.0V	—	40	120	μA
Digital input current	I_{IH}	V_{IH}=2.7V	—	100	145	μA
	I_{IL}	V_{IL}=0.4V	−145	−100	—	μA
Digital output voltage	V_{OH}	I_{OH}=−400μA	2.7	3.4	—	V
	V_{OL}	I_{OL}=1.6mA	—	0.2	0.4	V
Linearity error	E_L	$V_{RT}-V_{RB}$=2.0V	—	±0.25	±0.65	LSB
Differential linearity error	E_D	$V_{RT}-V_{RB}$=2.0V	—	±0.25	±0.65	LSB
Maximum conversion rate	F_{CMAX}		50	—	—	MHz
Maximum conversion rate			—	2	—	V_{p-p}
Equivalent input impedance *1	R_{IN}	V_{IN}=4V	—	50	—	kΩ
Input capacitance *1	C_{IN}	V_{IN}=4V	—	15	—	pF
Quantization noise *2	SINAD	f_{CLK}=35MHz, f_{IN}=5MHz	—	45	—	dB
		f_{CLK}=35MHz, f_{IN}=10MHz	—	43	—	dB
Input band *1	BW_F	V_{IN}=2V_{p-p}, −3dB	—	60	—	MHz
Clock duty *1	DTY	f_{CLK}=50MHz	—	50	—	%
Digital output delay *1	τ_d		—	20	—	ns

*1 Design reference value but not guaranteed one
*2 Total harmonics distortion included

■ Timing Chart



■ Output Code

Step	Input signal	Digital output	
		MINV=L	MINV=H
	2.000VFS 7.8125mV STEP	M L OVF 76543210	M L 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
29	VIN	Analogue input		3 to 5V	It is an input pin of analogue signal for A/D conversion circuit.
7, 18 26, 31	AGND	Analogue ground		0V	Connect AGND and DGND with the possible lowest impedance at one point as near as possible to the chip.
28 30	AV_{CC}	Analogue power supply pin		5V	It is a power supply pin for analogue. Connect tantalum capacitor of several μF and ceramic capacitor of 0.1 μF as near as possible to this pin between this pin and AGND.
5 21	DV_{CC}	Digital power supply pin		5V	It is a power supply pin for digital. Connect tantalum capacitor of several μF and ceramic capacitor of 0.1 μF as near as possible to this pin between this pin and DGND.
32 25	V_{RT} V_{RB}	Reference voltage high level, Reference voltage low level		5V 3V	It is used to set the reference voltage for comparator. Normally, V_{RT} is given 5V and V_{RB} is given 3V. Connect tantalum capacitor of several μF and ceramic capacitor of 0.1 μF in parallel between each pin and analogue ground.
4 22	DGND	Digital ground		0V	Connect AGND and DGND with the possible lowest impedance at one point as near as possible to the chip.
2	CLK	Clock input	Refer to the timing chart.	TTL	It is a clock for sampling. For their timing, refer to the timing chart.
6 9 10 11 12 13 14 15 16	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.
19	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.
23	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.
20 27	V_{RO} V_{RVCC}	Reference voltage output, Power supply pin for reference power supply		$V_{CC}-2.0V$ V_{CC}	It is a power supply output pin for A/D reference voltage. It is V_{CC} pin for reference power supply.

Pin No. 1, 3, 8, 17, 24 : NC