Panasonic

10-bit A/D Converter for Image-processing   AN8133FHQ

■ Overview

The AN8133FHQ is a high-speed 10-bit A/D converter of CMOS-processed construction for image processing use. Two-step parallel methods are applied to this product by employing a chopper-type comparator. As a result, the product ensures high-speed image processing with low power consumption.
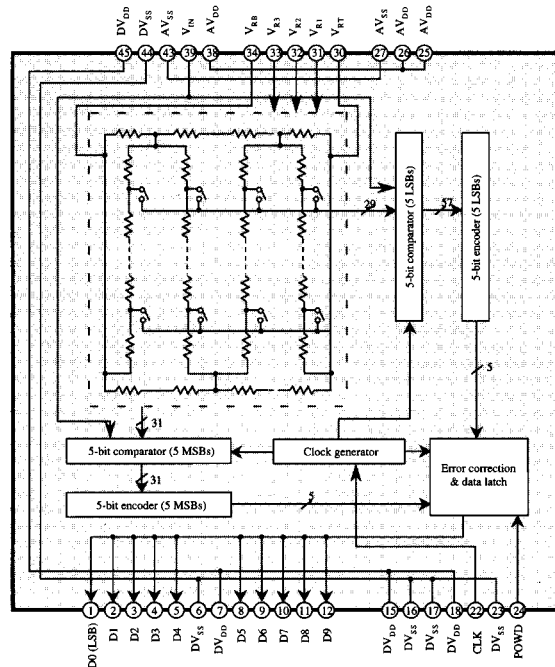
■ Features

● Power consumption as low as 90 mW (typ.)

● Operating with a single power supply of 3 V.

● 10-bit resolution

● Max. conversion rate of 40 MSPS (min.)

■ Applications

● Digital still cameras

● Digital VCR

● Medical equipment, such as supersonic diagnostic equipment

● Other digital image processing devices

Unit : mm

LQFP048-P-0707

■ Block Diagram

Pins 13, 14, 19, 20, 21, 28, 29, 35, 36, 37, 40, 41, 42, 46, 47 and 48 are N.C.

¶ The products and product specifications described in this document are subject to change without notice for reasons of 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.
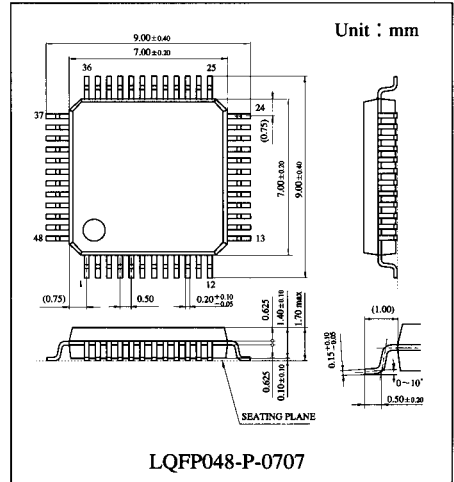
■ Pin Descriptions

Pin No.	Symbol	I/O	Function
7,15,18,45	DV_{DD}	I	Digital system power supply
6,16,17,23,44	DV_{SS}	I	Digital system ground
25,26,38	AV_{DD}	I	Analog system power supply
27,43	AV_{SS}	I	Analog system ground
30	V_{RT}	I	Top-side reference voltage input
31,32,33	VR1,VR2,VR3	I	Intermediate reference voltage (capacity coupling with AVSS pin)
34	V_{RB}	I	Bottom-side reference voltage input
39	V_{IN}	I	Analog signal input
22	CLK	I	Clock input Sampling at the clock falling edge and digital-code output at the rising edge with a 2.5-clock interval.
1~5 8~12	D0~D4 D5~D9	O	Digital code output (binary output) D0: LSB D9: MSB
24	POWD	I	H: Power down mode L: Normal operation mode The level of digital output is fixed to L in power-down mode.

■ Absolute Maximum Ratings

Parameter	Symbol	Rating	Unit	Note
Storage temperature	T_{STG}	-55~+125	℃	1
Operating ambient temperature	T_{OPR}	-20~+70	℃	1
Supply voltage	V_{DD}	-0.3~4.6	V	
Supply current	I_{DD}	120	mA	
Power dissipation	P_D	249	mW	2

Note 1) Ta＝25℃ except storage temperature and operating ambient temperature.

Note 2) The above power dissipation shows the package power dissipation at Topr is 70℃.

■ Recommended Operating Conditions (Ta=25℃±2℃)

Parameter	Symbol	min.	typ.	min.	Unit
Supply voltage	AVDD/DVDD	2.7	3.0	3.3	V
Reference voltage	VRT	2.0	—	VDD	V
	VRB	VSS	—	1.0	V
Analog input voltage	VIN	VRB	—	VRT	V
Digital input voltage (CLK,POWD)	VIH	2.4	—	VDD	V
	VIL	VSS	—	0.8	V

■ Electrical Characteristics (Ta=25℃±2℃, AVDD=DVDD=3.0V)

Parameter	Symbol	Conditions	min.	typ.	max.	Unit
Supply current	IDD	fCLK=40MHz	19	30	41	mA
Supply current in power-down mode	IPOWD	fCLK=40MHz	—	—	0.5	mA
Reference resistance(VRB to VRT)	RREF		250	470	700	Ω
Digital input current H	IDINH	CLK,POWD,VIN=VDD-0.8V	—	—	45	μA
Digital input current L	IDINL	CLK,POWD,VIN=0.4V	—	—	45	μA
Analog input current H	IAIH	VIN=3.0V	—	—	200	μA
Analog input current L	IAIL	VIN=1.0V	-200	—	—	μA
Digital input voltage H	VIH		2.4	—	VDD	V
Digital input voltage L	VIL		VSS	—	0.8	V
Digital output current H	IOH	VOH=VDD-0.8V	—	—	-1.5	mA
Digital output current L	IOL	VOL=-0.4V	1.5	—	—	mA
Max. conversion rate	FCMAX		40	—	—	MSPS
Differential linearity error	ED		—	±0.5	±1.0	LSB
Quantization noise(See Note 1.)	S/N		42	47	—	dB

Note 1) This noise includes total harmonic distortion.

■ Timing Chart

Analog input signal is sampled at the falling edge of the clock signal and digital outputs data at the rising edge of the clock signal after an interval of 2.5 clock counts.
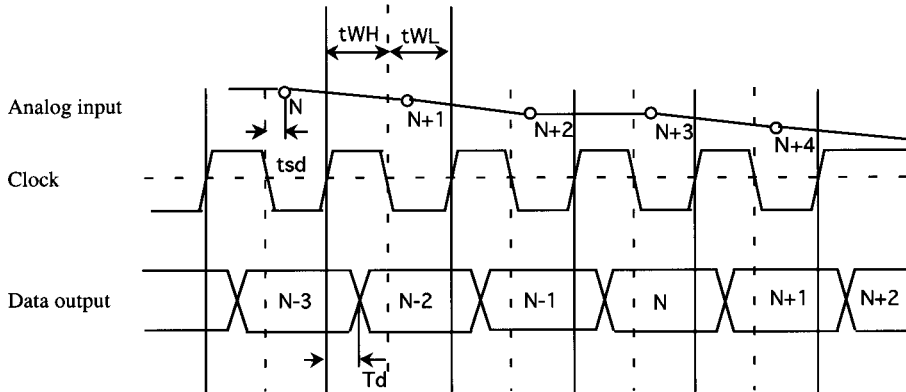
○:Analog signal sampling point

■ Output Codes

Step	Input Signal	Digital Output 9876543210
	Analog Voltage 2.000VFS	
000	1.000	0000000000
001	1.002	0000000001
.	.	.
.	.	.
.	.	.
511	1.999	0111111111
512	2.001	1000000000
513	2.003	1000000001
.	.	.
.	.	.
.	.	.
1023	3.000	1111111111