ICs for TV

Panasonic

AN8130K

High-speed and Low Power Consumption 10-bit A/D Converter IC

■ Overview

The AN8130K is a 10-bit A/D converter for video processing and it offers low power consumption adopting Bi-CMOS process.

■ Features

- 10-bit resolution
- High speed : max. conversion rate 20MSPS
- Low power consumption : 750mW
- S/H circuit built-in
- Serial/parallel type

Unit : mm

42-Pin Shrunk DIL Plastic Package (SDIP042-P-0600A)
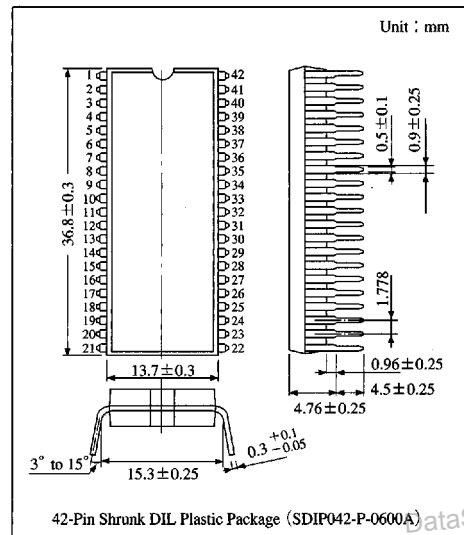
■ Block Diagram
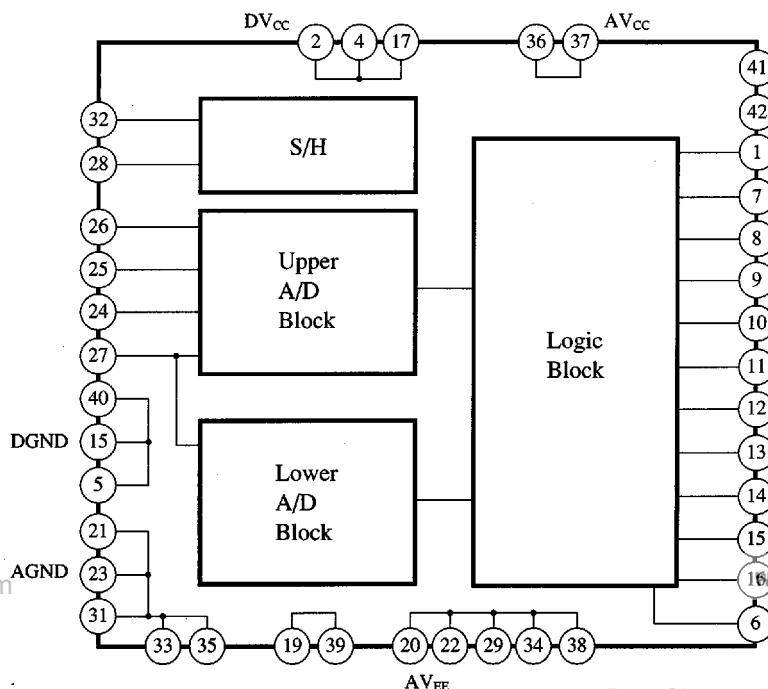
■ Absolute Maximum Ratings (Ta＝25℃)

Parameter	Symbol	Rating	Unit
Supply voltage	V_{EE}	-6 to $+0.5$	V
	V_{CC}	-0.5 to $+6$	V
Analog input voltage	V_{IN}	V_{EE} to V_{CC}	V
Digital input voltage	V_{CLKSH}/V_{CLKAD}	-0.5 to $V_{CC}+0.5$	V
Reference voltage	V_{RB}/V_{RT}	V_{EE} to $+0.5$	V
Digital output current	I_{OH}	-15	mA
Power dissipation	P_D	1100	mW
Operating ambient temperature	T_{opr}	-20 to $+70$	℃
Storage temperature	T_{stg}	-55 to $+150$	℃

■ Recommended Operating Range (Ta＝25℃)

Parameter	Symbol	min	typ	max	Unit
Positive supply voltage	V_{CC}	4.75	5	5.25	V
Negative supply voltage	V_{EE}	-5.25	-5	-4.75	V
Reference voltage	V_{RT}	—	0	—	V
	V_{RB}	—	-2	—	V
Analog input voltage	V_{IN}	V_{RB}		V_{RT}	V
Digital input voltage	V_{IH}	2	—	4	V
	V_{IL}	0	—	0.8	V
Digital output current	I_{OH}	—	-0.4	—	mA
	I_{OL}	—	1.6	—	mA
S/H clock input pulse width	t_H *	15	20	—	ns
A/D clock input pulse width	t_H *	35	40	—	ns

* At $f_{CLK}=16MH_Z$

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

Parameter	Symbol	Condition	min	typ	max	Unit
Supply current	DI_{CC}		—	5	10	mA
	AI_{CC}		—	14	28	mA
	I_{EE}		-164	-131	—	mA
Reference resistor current	I_{RT}	$V_{RT}=0V$	2.4	3	3.6	mA
	I_{RB}	$V_{RB}=-2V$	-3.6	-3	-2.4	mA
Input bias current	I_{IN}	$V_{INSB}=-1V$	—	10	100	μA
Clock input current	I_{IH}	$V_{CLKAD}=V_{CLKSH}=2.7V$	—	1	8	μA
	I_{IL}	$V_{CLKAD}=V_{CLKSH}=0.4V$	—	1	8	μA
Digital output voltage	V_{OH}	$I_{OB}=-400\mu A$	2.7	3.4	—	V
	V_{OL}	$I_{OL}=1.6mA$	—	—	0.4	V
Linearity error	E_L	$V_{IN}=2V_{PP}$	—	±1	—	LSB
Differential linearity error	E_D	$V_{IN}=2V_{PP}$	—	±0.5	±1	LSB
Maximum conversion rate	F_C	$V_{IN}=2V_{PP}$	20	—		MSPS
Quantization noise	S/N	$f_{CLK}=16MH_Z$, $f_{IN}=1MH_Z$	—	53	—	dB
		$f_{CLK}=16MH_Z$, $f_{IN}=8MH_Z$	—	49	—	dB
		$f_{CLK}=20MH_Z$, $f_{IN}=1MH_Z$	—	52	—	dB
		$f_{CLK}=20MH_Z$, $f_{IN}=8MH_Z$	—	47	—	dB

■ Electrical Characteristics (cont.) $(V_{CC}=5V, V_{EE}=-5V, Ta=25℃)$

Parameter	Symbol	Condition	min	typ	max	Unit
Differential gain	DG	IRE standard 15kHz Sawtooth 40% subcarrier $f_{CLK}=20MHz$, Nolock	—	0.5	1	%
Differential phase	DP		—	0.5	1	deg
Digital output delay	$τ\,d$		—	33	—	ns
Clock delay	$τ_{CLK}$	$f_{CLK}=16MHz$	−5	0	5	ns
Input capacitance	C_{IN}		—	10	—	pF
Input offset voltage	V_{OFS}		—	0	—	V

■ Application Circuit

ICs for TV   **AN8130K**
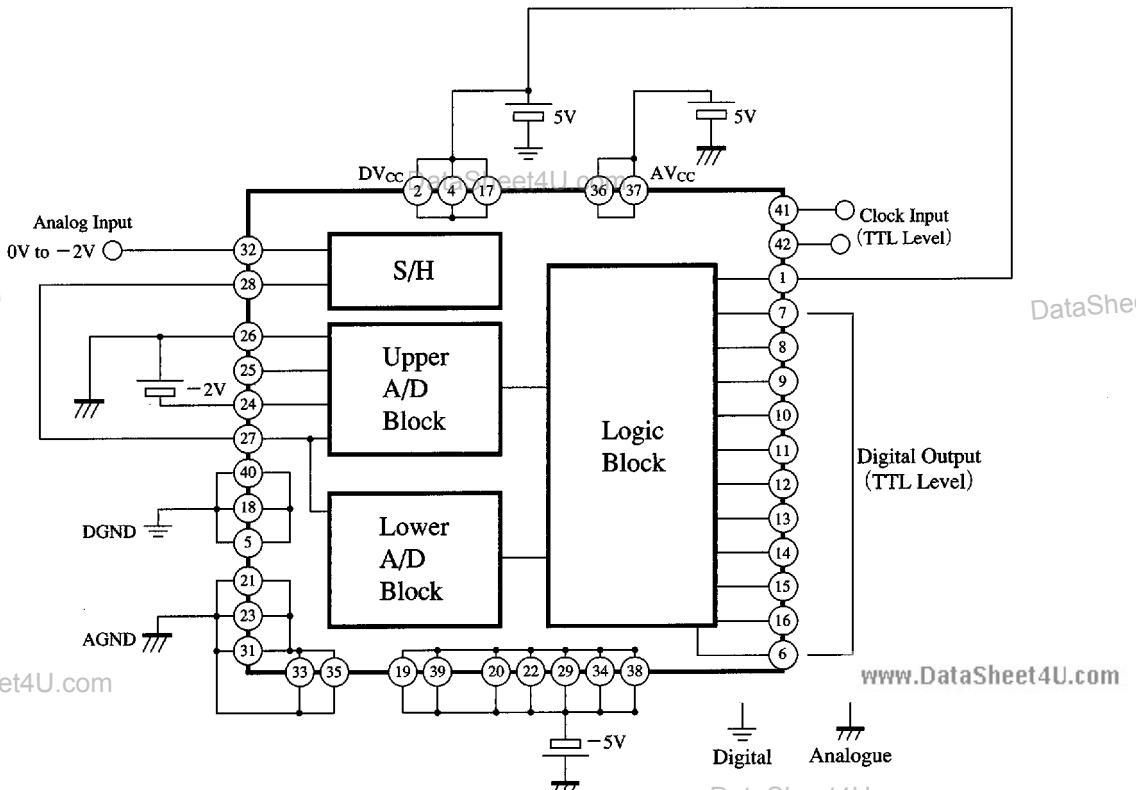
■ Pin Descriptions

Pin No.	Symbol	Description	Typ. waveform	Voltage level	Pin No.	Symbol	Description	Typ. waveform	Voltage level
1	INV	Digital output inversion pin	—	TTL	22	AV_{EE}	Analog negative supply voltage	—	$-5V$
2	DV_{CC}	Digital positive supply voltage	—	5V	23	AGND	Analog GND	—	0V
3	N.C.	Non connection	—	—	24	V_{RB}	Reference voltage low level	—	$-2V$
4	DV_{CC}	Digital positive supply voltage	—	5V	25	V_{RM}	Reference voltage midpoint level	—	
5	DGND	Digital GND	—	0V	26	V_{RT}	Reference voltage high level	—	0V
6	OVF	Overflow pin			27	V_{INAD}	Analog input (A/D)	∿	0 to $-2V$
7	D0	Digital output (LSB)			28	V_{OSH}	Analog output (S/H)	∿	0 to $-2V$
8	D1	Digital output			29	AV_{EE}	Analog negative supply voltage	—	$-5V$
9	D2	Digital output			30	NC	Non connection	—	—
10	D3	Digital output			31	AGND	Analog GND	—	0V
11	D4	Digital output	Refer to the timing chart.	TTL	32	V_{INSH}	Analog input (S/H)	∿	0 to $-2V$
12	D5	Digital output			33	AGND	Analog GND	—	0V
13	D6	Digital output			34	AV_{EE}	Analog negative supply voltage	—	$-5V$
14	D7	Digital output			35	AGND	Analog GND	—	0V
15	D8	Digital output			36	AV_{CC}	Analog positive supply voltage	—	5V
16	D9	Digital output (MSB)			37	AV_{CC}	Analog positive supply voltage	—	5V
17	DV_{CC}	Digital positive supply voltage	—	5V	38	AV_{EE}	Analog negative supply voltage	—	$-5V$
18	DGND	Digital GND	—	0V	39	AV_{EE}	Analog negative supply voltage	—	$-5V$
19	AV_{EE}	Analog negative supply voltage	—	$-5V$	40	DGND	Digital GND	—	0V
20	AV_{EE}	Analog negative supply voltage	—	$-5V$	41	CLKSH	Clock input (S/H)	Refer to the timing chart.	TTL
21	AGND	Analog GND	—	0V	42	CLKAD	Clock input (A/D)		

■ Supplementary Explanation
• Timing Chart
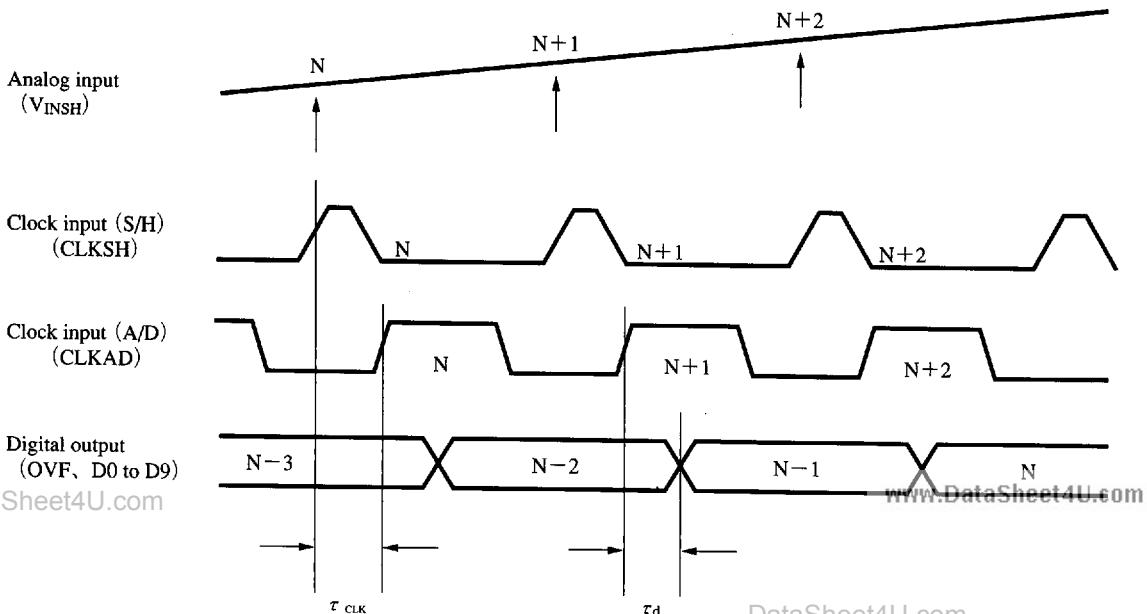
■ Supplementary Explanation (cont.)
• Output Code

Step	Input signal	Digital output
	2.000VFS 1.953mV STEP	OVFM L 0123456789
	INV= "H"	
000	$-$0.000000	00000000000
001	$-$0.001953	00000000001
.	.	.
.	.	.
.	.	.
511	$-$0.998047	00111111111
512	$-$1.000000	01000000000
513	$-$1.001953	01000000001
.	.	.
.	.	.
.	.	.
1023	$-$1.998047	01111111111
1024	$-$2.000000	11111111111