

# AN8124K

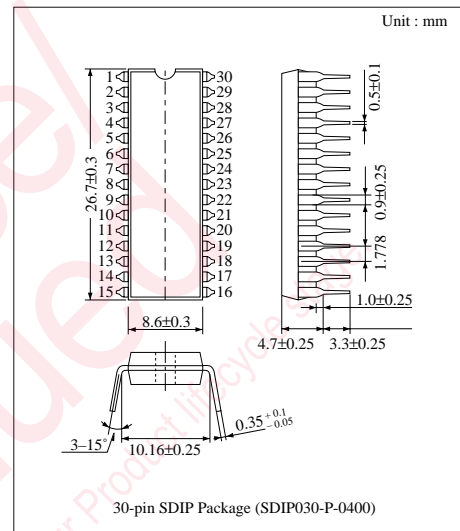
## 8-Bit A/D and D/A Compound Converter

### ■ Overview

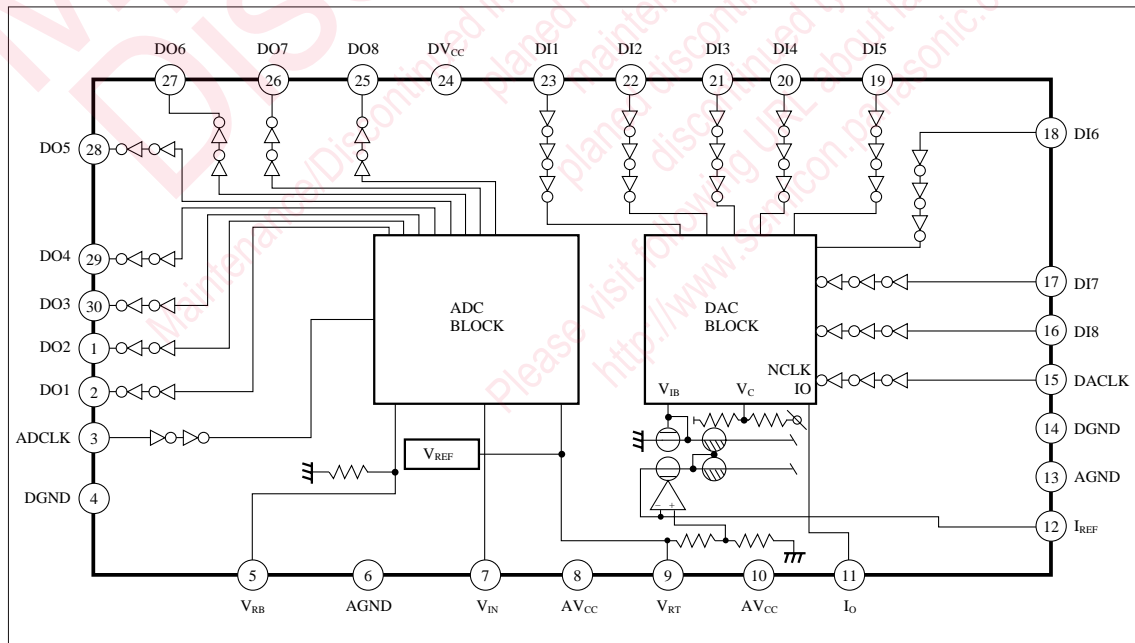
The AN8124K is a 8-bit A/D and D/A compound converter for image processing.

### ■ Features

- Reference Voltage Source Built-in
- Maximum conversion rate : 20 MSPS (min.)
- Sample holding circuit not required
- Low consumption power : 250 mW (typ.)
- Digital input/output level : TTL compatible



### ■ Block Diagram



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

Parameter	Symbol	Rating	Unit
Supply voltage	V <sub>CC</sub>	7	V
Supply current	I <sub>CC</sub>	100	mA
Analogue input voltage	V <sub>IN</sub>	-0.5 to V <sub>CC</sub> + 0.3	V
Digital input voltage	V <sub>CLK</sub>	-0.5 to V <sub>CC</sub> + 0.3	V
Digital output current	I <sub>OH</sub>	-15	mA
Digital output current	I <sub>OL</sub>	15	mA
Reference resistive voltage	V <sub>RT</sub>	-0.5 to V <sub>CC</sub> + 0.3	V
	V <sub>RB</sub>	-0.5 to V <sub>CC</sub> + 0.3	V
Digital input voltage	V <sub>DI</sub>	-0.5 to V <sub>CC</sub> + 0.3	V
Analogue output current	I <sub>O</sub>	30	mA
Reference current	I <sub>REF</sub>	10	mA
Power dissipation	P <sub>D</sub>	700	mW
Operating ambient temperature	T <sub>opr</sub>	-20 to +70	°C
Storage temperature	T <sub>sg</sub>	-55 to +150	°C

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

Parameter	Symbol	Condition	min	typ	max	Unit
Supply voltage	V <sub>CC</sub>		4.75	5	5.25	V
Analogue input voltage	V <sub>IN</sub>		V <sub>RB</sub>	—	V <sub>RT</sub>	V
Output load resistance	R <sub>O</sub>		—	220	—	Ω
Digital input voltage	V <sub>IH</sub>		2.4	—	—	V
	V <sub>IL</sub>		—	—	0.8	V
Clock input pulse width	t <sub>WH</sub>	Refer to the timing chart.	25	—	—	ns
	t <sub>WL</sub>	Refer to the timing chart.	25	—	—	ns
Setting-up time	t <sub>s</sub>	Refer to the timing chart.	20	—	—	ns
Holding time	t <sub>H</sub>	Refer to the timing chart.	20	—	—	ns

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

Parameter	Symbol	Condition	min	typ	max	Unit
Supply current	I <sub>CC</sub>	f <sub>CLK</sub> =15MHz, R <sub>REF</sub> =1.8kΩ	—	50	80	mA
Reference voltage	V <sub>RT</sub>		3.1	3.5	3.9	V
	V <sub>RB</sub>	V <sub>IN</sub> = 2.5V	1.1	1.5	1.9	V
Input bias current	I <sub>IN</sub>	V <sub>IN</sub> = 2.4V	—	40	120	μA
Clock input current	I <sub>IH</sub>	V <sub>IL</sub> = 0.4V	—	—	30	μA
	I <sub>IL</sub>	I <sub>OH</sub> = -2mA	-30	—	—	μA
Digital output voltage	V <sub>OH</sub>	I <sub>OL</sub> = 2mA	V <sub>CC</sub> - 0.8	—	—	V
	V <sub>OL</sub>		—	—	0.4	V

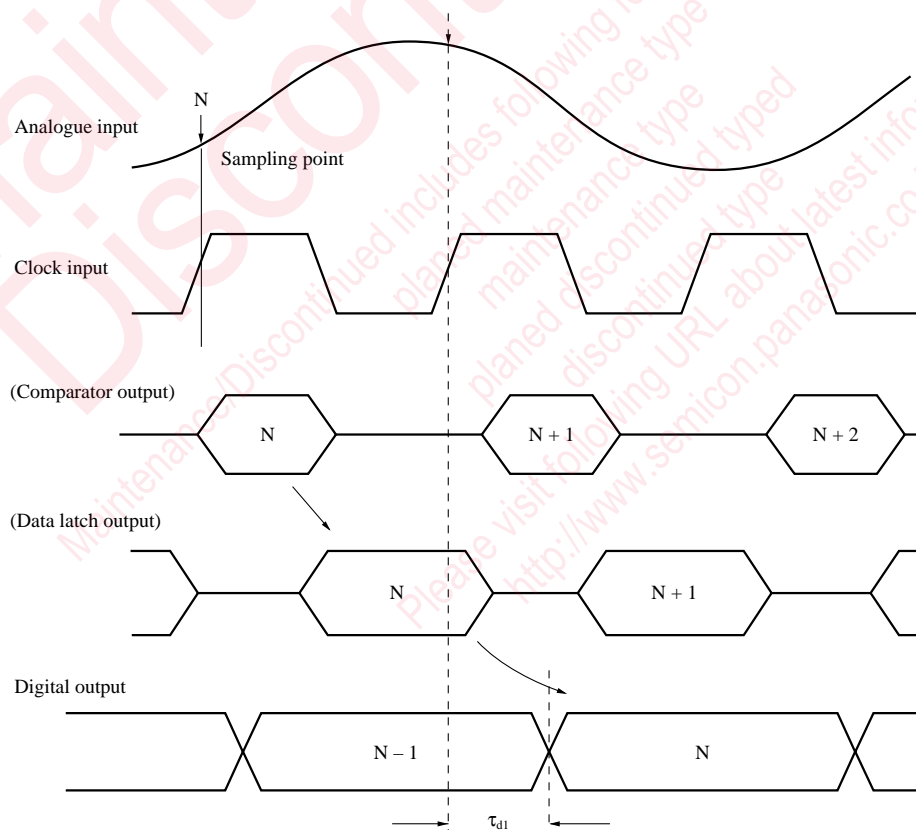
#### A/D, D/A

Differential gain	DG		—	1	—	%
Differential phase	DP	f <sub>IN</sub> = 4MHz, f <sub>S</sub> = 20MHz	—	0.5	—	deg
Quantization noise	S/N		33	40	—	dB

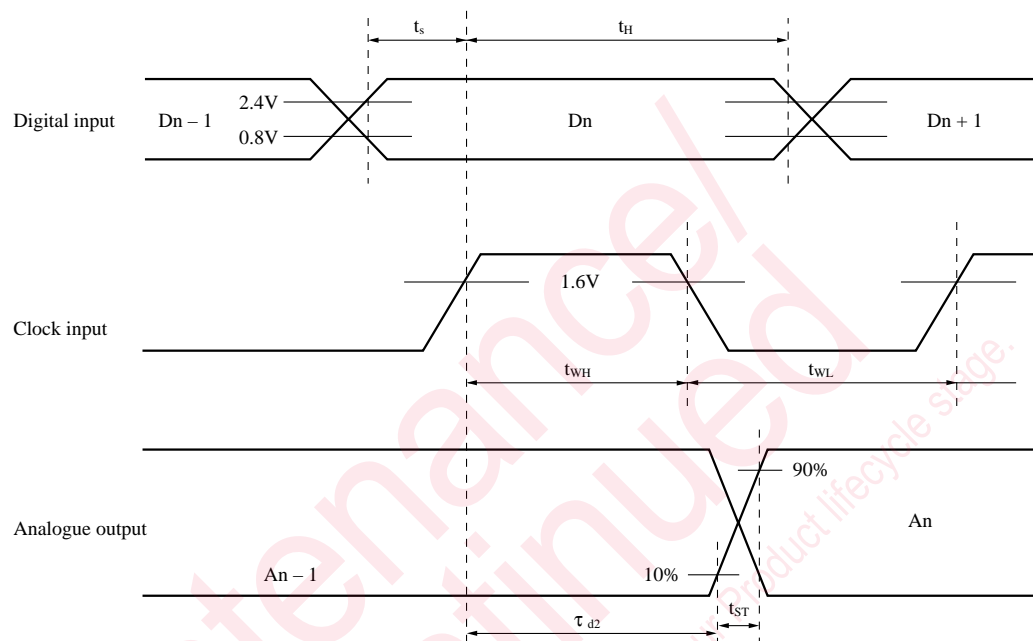
■ Electrical Characteristic (Cont.) ( $V_{CC}=5V$ ,  $T_a=25^\circ C$ )

Parameter	Symbol	Condition	min	typ	max	Unit
<b>A/D</b>						
Resolution	RES		—	8	—	bit
Maximum conversion rate	$F_{CMAX}$		20	—	—	MSPS
Linearity error	$E_L$	$V_{RT} = 3.5V$ , $V_{RB} = 1.5V$	—	$\pm 0.5$	$\pm 1$	LSB
Differential linearity error	$E_D$	$V_{RT} = 3.5V$ , $V_{RB} = 1.5V$	—	—	$\pm 0.5$	LSB
Equivalent input impedance	$R_{IN}$	$V_{IN} = 2.5V$	—	500	—	k $\Omega$
Input capacitance	$C_{IN}$	$V_{IN} = 2.5V$	—	40	—	pF
Digital output delay	$\tau_{d1}$		—	25	—	ns
<b>D/A</b>						
Resolution	RES		—	8	—	bit
Maximum conversion rate	$F_{CMAX}$	$R_{OUT} = 220\Omega$ , $R_{REF} = 1.8k\Omega$	20	—	—	MSPS
Linearity error	$E_L$	$R_{OUT} = 220\Omega$ , $R_{REF} = 1.8k\Omega$	—	—	$\pm 0.5$	LSB
Differential linearity error	$E_D$	$R_{OUT} = 220\Omega$ , $R_{REF} = 1.8k\Omega$	—	—	$\pm 0.5$	LSB
Full-Scale current	$I_{FS}$	$R_{OUT} = 220\Omega$ , $R_{REF} = 1.8k\Omega$	3.64	4.55	5.45	mA
Settling time	$t_{ST}$	$R_{OUT} = 220\Omega$ , $R_{REF} = 1.8k\Omega$	—	—	50	ns
Analogue output delay	$\tau_{d2}$		—	25	—	ns

■ A/D Sampling Timing Chart



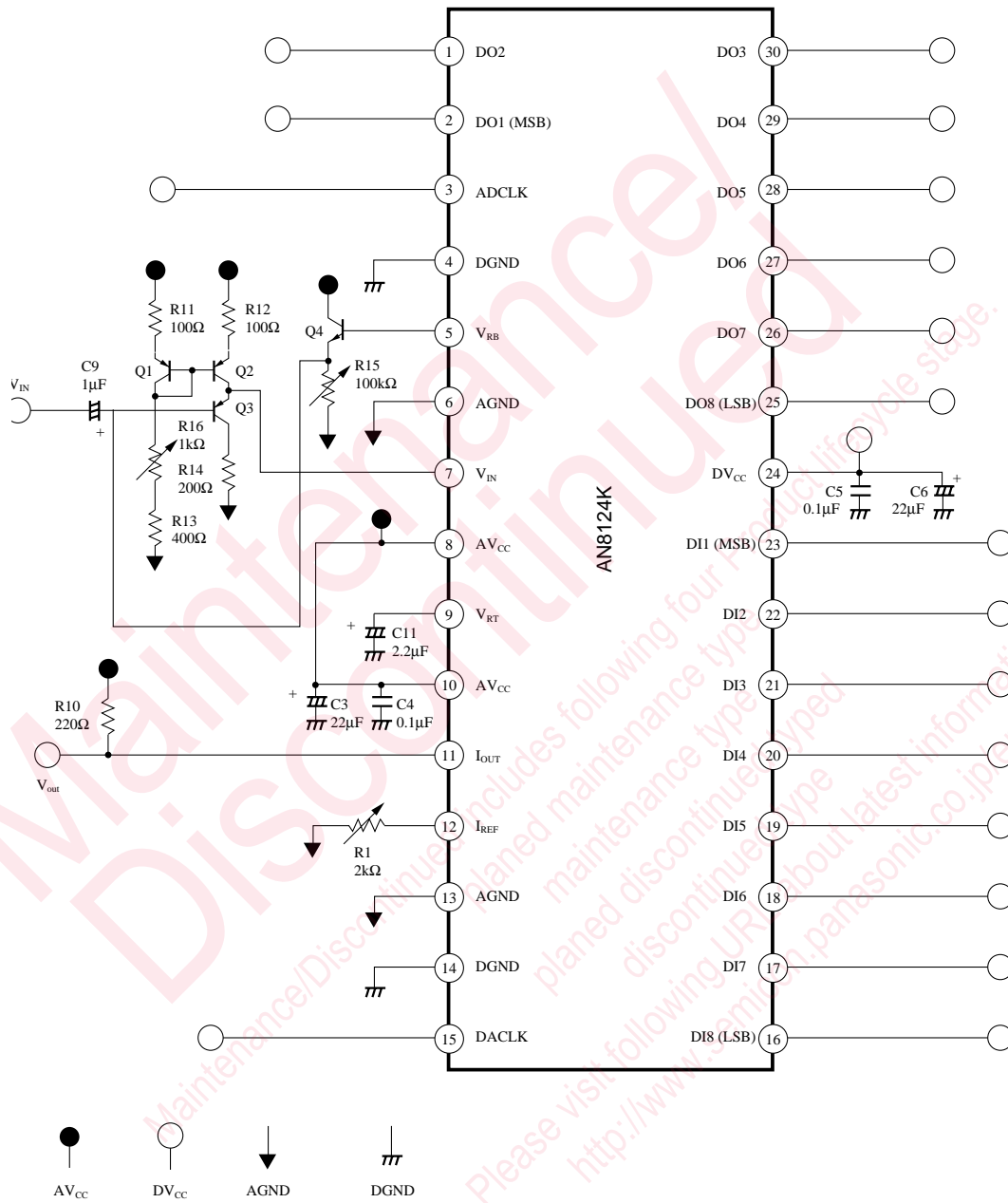
### ■ D/A Timing Chart



### ■ Pin Descriptions

Pin No.	Symbol	Pin name	Pin No.	Symbol	Pin name
1	DO2	Digital output 2-bit	16	DI8	Digital input 8-bit (LSB)
2	DO1	Digital output 1-bit (MSB)	17	DI7	Digital input 7-bit
3	ADCLK	A/D convertor clock input	18	DI6	Digital input 6-bit
4	DGND	Digital ground	19	DI5	Digital input 5-bit
5	$V_{RB}$	Reference voltage low level	20	DI4	Digital input 4-bit
6	AGND	Analogue ground	21	DI3	Digital input 3-bit
7	$V_{IN}$	Analogue input pin	22	DI2	Digital input 2-bit
8	$AV_{CC}$	Analogue power supply pin	23	DI1	Digital input 1-bit (MSB)
9	$V_{RT}$	Reference voltage high level	24	DV <sub>CC</sub>	Digital power supply pin
10	$AV_{CC}$	Analogue power supply pin	25	DO8	Digital output 8-bit (LSB)
11	$I_{OUT}$	Analogue output	26	DO7	Digital output 7-bit
12	$I_{REF}$	Reference current setting	27	DO6	Digital output 6-bit
13	AGND	Analogue ground	28	DO5	Digital output 5-bit
14	DGND	Digital ground	29	DO4	Digital output 4-bit
15	DACLK	D/A convertor clock input	30	DO3	Digital output 3-bit

■ Application Circuit



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