

AN8140K

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

■ Overview

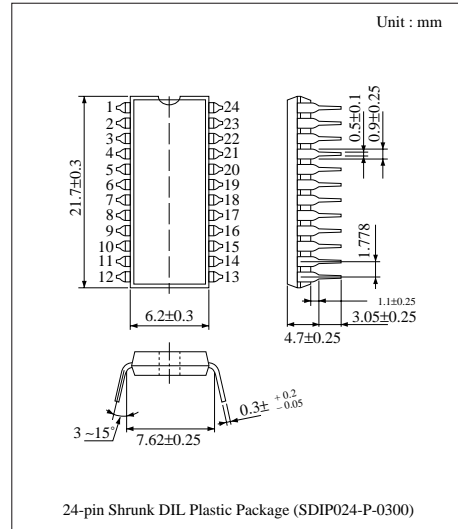
The AN8140K is a 10-bit D/A converter for image processing which has realized low power consumption by using the Bi-CMOS process.

■ Features

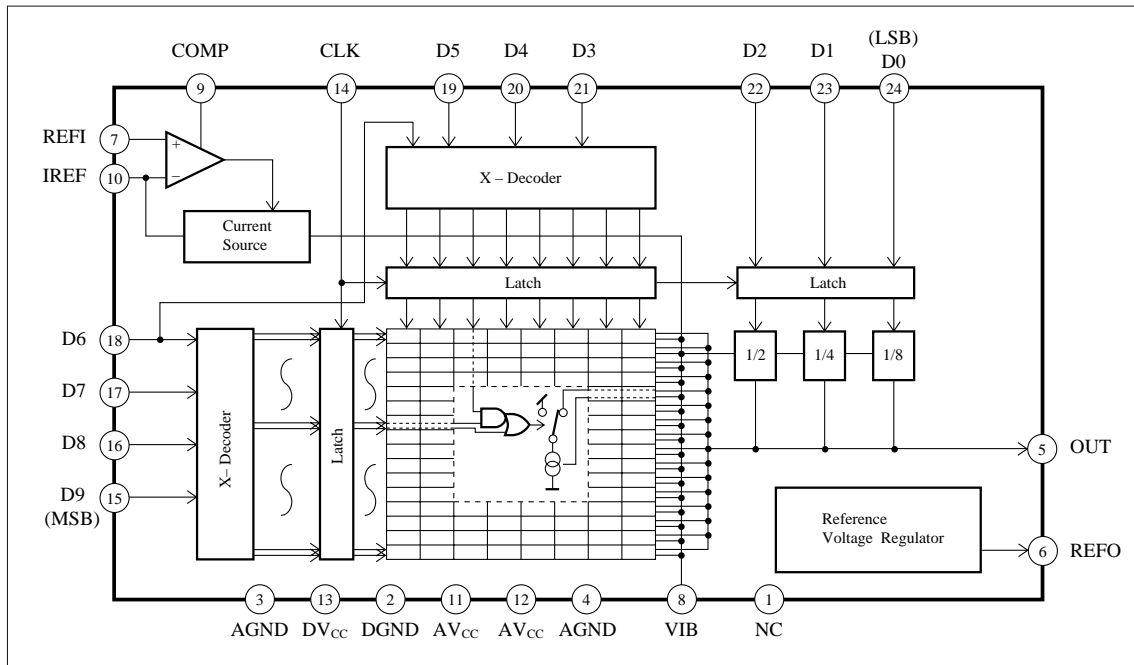
- 10-bit resolution
- High speed : maximum conversion rate of 50MSPS
- Low power consumption : 150mW
- TTL compatible input level
- Single 5V power supply
- Built-in reference power supply

■ Application Field

- Image equipment such as hi-vision device
- OA equipment such as image scanner
- Measuring equipment such as digital oscilloscope



■ Block Diagram



■ Main Characteristics ($V_{CC}=5.0V$, $T_a=25^\circ C$)

Parameter	Condition	Rating	Unit
Resolution		10	bit
Linearity error	$R_{REF} = 470\Omega$	± 1.0	LSB
Differential linearity error	$R_O = 75\Omega$	± 1.0	LSB
Maximum conversion rate	$V_{REF0} - V_{REF1} = 1.4V$	50	MSPS

■ Absolute Maximum Rating ($T_a=25^\circ C$)

Parameter	Symbol	Rating	Unit
Supply voltage	V_{CC}	-0.3 to +7.0	V
Digital input voltage	V_{IN}	-0.3 to DV_{CC}	V
Analogue output current	I_O	30	mA
Reference input voltage	V_{REF1}	-0.3 to AV_{CC}	V
Power dissipation	P_D	700	mW
Operating ambient temperature	T_{opr}	-20 to +70	$^\circ C$
Storage temperature	T_{stg}	-55 to +150	$^\circ C$

■ Electrical Characteristics ($V_{CC}=5.0V$, $T_a=25^\circ C$)

Parameter	Symbol	Rating	min	typ	max	Unit
Supply current	I_{CC}		—	30	50	mA
Digital input leak current	I_{LK1}	$V_{IN} = 0V, 5V$	—	—	± 30	μA
REF1 input leak current	I_{LK2}	$V_{IN} = 0V, 5V$	—	—	± 30	μA
Reference output voltage	V_{REF0}	$I_{REF0} = 3.0mA$	2.16	2.7	3.24	V
Linearity error	E_L	$R_{REF} = 470\Omega$ $R_O = 75\Omega$ $V_{REF0} - V_{REF1} = 1.4V$	—	± 0.5	± 1	LSB
Differential linearity error	E_D		—	± 0.5	± 1	LSB
Maximum conversion rate	F_C		50	—	—	MSPS
Full-scale output voltage	V_{FS}		4.9	5.0	5.1	V
Zero-scale output voltage	V_{ZS}		3.8	4.0	4.2	V
Settling time	t_{ST}		—	—	20	ns

■ Recommended Operating Conditions ($T_a=25^\circ C$)

Parameter	Symbol	Conditions	min	typ	max	Unit
Supply voltage	V_{CC}		4.75	5.0	5.25	V
Reference voltage $V_{REF0} = 2.7V$	V_{REF1}	$R_O = 75\Omega$, $R_{REF} = 470\Omega$	—	1.3	—	V
Output load resistance	R_O		—	75	—	Ω
Digital input voltage	V_{IH}		2.4	—	—	V
	V_{IL}		—	—	0.8	V
Clock input pulse width	t_{WH}	*1	8 *2	—	—	ns
	t_{WL}	*1	8 *2	—	—	ns
Setting-up time	t_S	*1	5	—	—	ns
Holding time	t_H	*1	1	—	—	ns

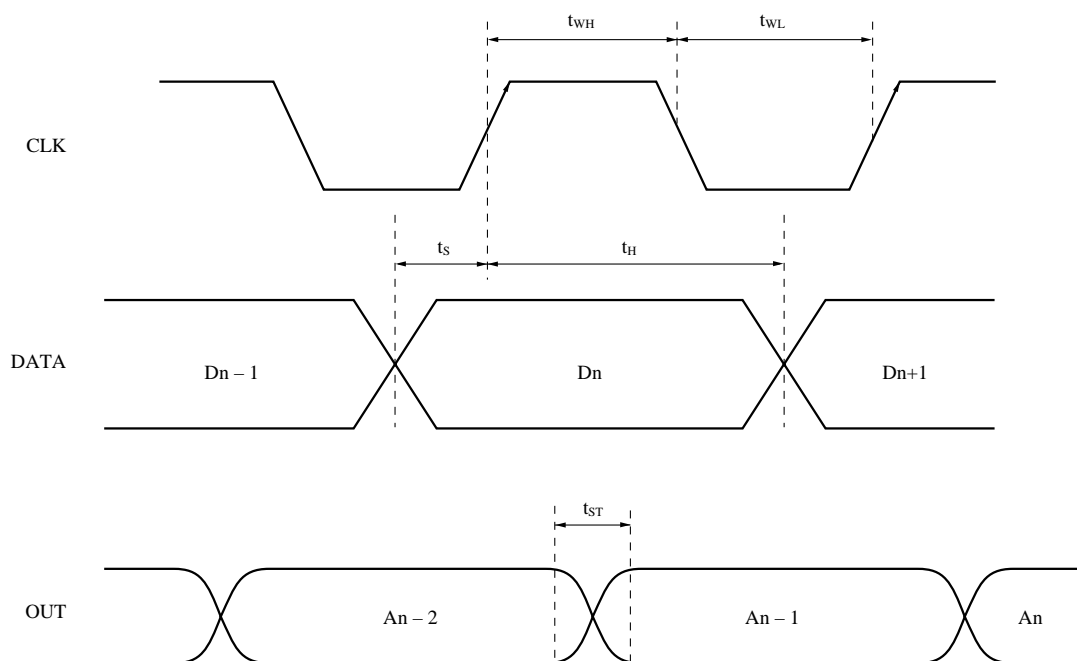
*1 : Refer to the timing chart.

*2 : $t_{WH} + t_{WL} \geq 20ns$

■ Pin Descriptions

Pin No.	Symbol	Pin name	Pin No.	Symbol	Pin name
1	NC	No connection pin	13	DV _{CC}	Digital power supply
2	DGND	Digital GND	14	CLK	Clock input
3	AGND	Analogue GND	15	D9	Digital input 1-bit (MSB)
4	AGND	Analogue GND	16	D8	Digital input 2-bit
5	OUT	Analogue output	17	D7	Digital input 3-bit
6	REFO	Reference voltage output	18	D6	Digital input 4-bit
7	REFI	Reference voltage input	19	D5	Digital input 5-bit
8	V _{IB}	Stabilized capacitive pin	20	D4	Digital input 6-bit
9	COMP	Compensation capacitive pin	21	D3	Digital input 7-bit
10	I _{REF}	Reference current pin	22	D2	Digital input 8-bit
11	AV _{CC}	Analogue power supply	23	D1	Digital input 9-bit
12	AV _{CC}	Analogue power supply	24	D0	Digital input 10-bit (LSB)

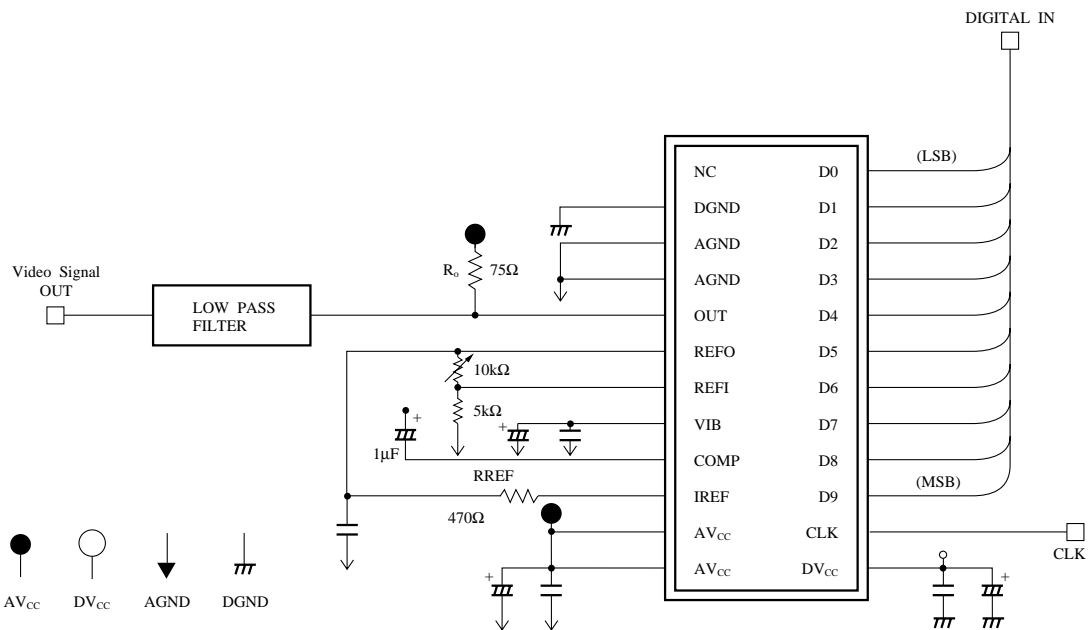
■ Timing Chart



■ Output Code

Step	Digital input	Output voltage
	0123456789	V_{OUT}
000	000000000	4.0000
001	000000001	4.0010
.	.	.
.	.	.
.	.	.
511	011111111	4.4995
512	100000000	4.5005
513	100000001	4.5015
.	.	.
.	.	.
.	.	.
1022	111111110	4.9990
1023	111111111	5.0000

■ Application Circuit





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