AN8140K

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

■ Overview

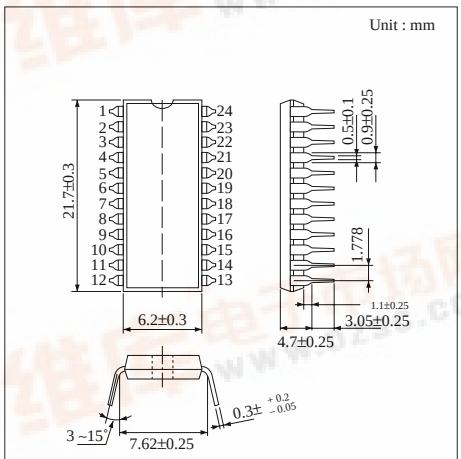
The AN8140K is a 10-bit D/A converter for image processing which has realized low power comsumption by using the Bi-CMOS process.

■ Features

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

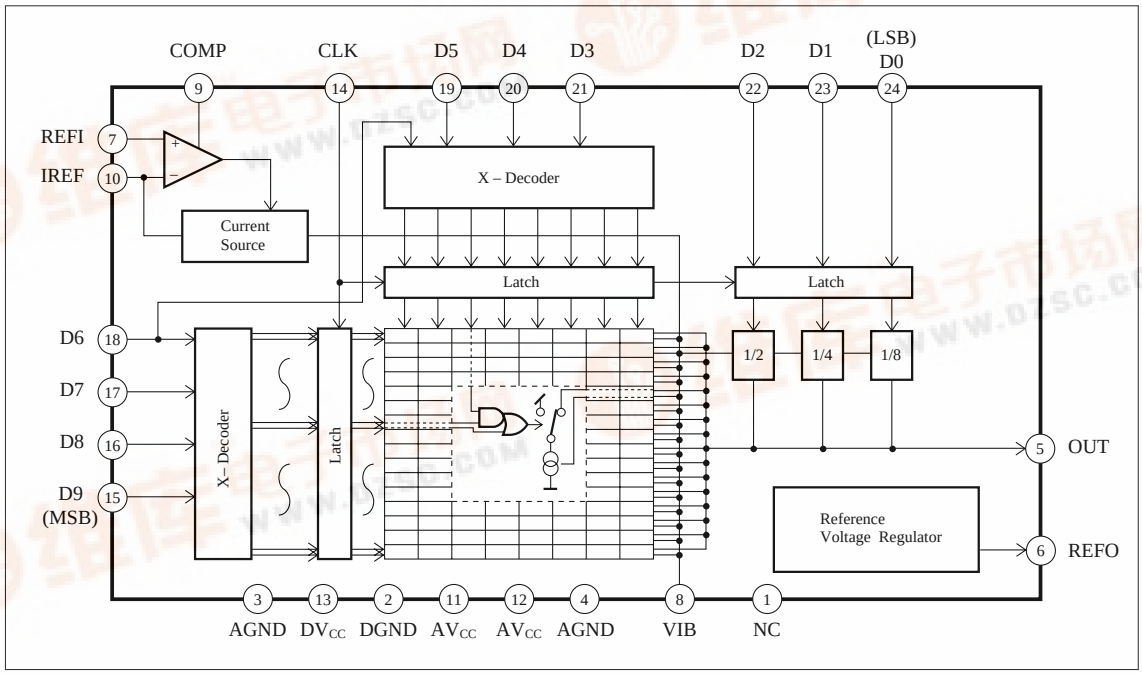
■ Application Field

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



24-pin Shrunk DIL Plastic Package (SDIP024-P-0300)

■ Block Diagram



■ Main Characteristics (V_{CC}=5.0V, Ta=25˚C)

Parameter	Condition	Rating	Unit
Resolution		10	bit
Linearity error	R_{REF} = 470Ω	±1.0	LSB
Differential linearity error	R_O = 75Ω	±1.0	LSB
Maximum conversion rate	V_{REFO} – V_{REFI} = 1.4V	50	MSPS

■ Absolute Maximum Rating (Ta=25˚C)

Paremeter	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_{REFI}	– 0.3 to AV_{CC}	V
Power dissipation	P_D	700	mW
Operating ambient temperature	T_{opr}	–20 to + 70	˚C
Storage temperature	T_{stg}	–55 to +150	˚C

■ Electrical Characteristics (V_{CC}=5.0V, Ta=25˚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
REFI input leak current	I_{LK2}	V_{IN}= 0V, 5V	—	—	±30	µA
Reference output voltage	V_{REFO}	I_{REFO}= 3.0mA	2.16	2.7	3.24	V
Linearty error	E_L	R_{REF}= 470Ω R_O= 75Ω V_{REF0} – V_{REFI}= 1.4V	—	±0.5	±1	LSB
Differential linearty 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 (Ta=25˚C)

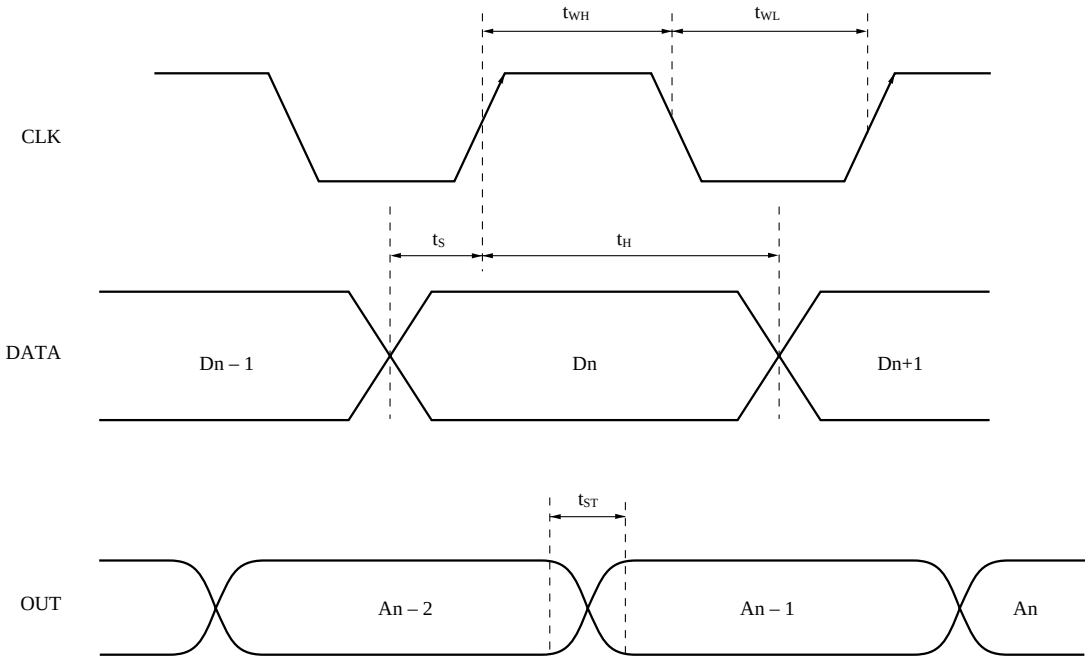
Parameter	Symbol	Conditions	min	typ	max	Unit
Supply voltage	V_{CC}		4.75	5.0	5.25	V
Regerence voltage v_{REFO} = 2.7V	V_{REFI}	R_O = 75Ω, R_{REF} = 470Ω	—	1.3	—	V
Output load resistance	R_O		—	75	—	Ω
Digital input voltage	V_{IH}		2.4	—	—	V
	V_{IL}		—	—	0.8	V
Clock input pulse width	t_{WH}	*1	8 *2	—	—	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 : $t_{WH}+t_{WL} \geq 20$ns

■ 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	0000000000	4.0000
001	0000000001	4.0010
.	.	.
.	.	.
.	.	.
511	0111111111	4.4995
512	1000000000	4.5005
513	1000000001	4.5015
.	.	.
.	.	.
.	.	.
1022	1111111110	4.9990
1023	1111111111	5.0000

■ Application Circuit