

AN6856

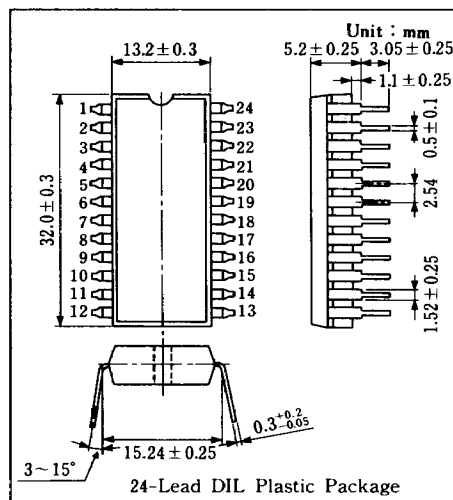
High Speed 6-bit A/D Converter

Outline

The AN6856 is a high-speed and low power dissipation 6-bit monolithic bipolar IC (A/D converter parallel type) and suitable for high-speed data conversion, computer input data conversion such as digitizer of video band signal.

Features

- 6-bit resolution
- High speed, maximum conversion speed 35 MSPS
- Sample & hold circuits are not necessary
- Input dynamic range is 2 V_{p-p}
- Low power dissipation: 250 mW typ.
- Digital inputs and outputs are ECL compatible
- 6-bit parallel output (Pure binary)



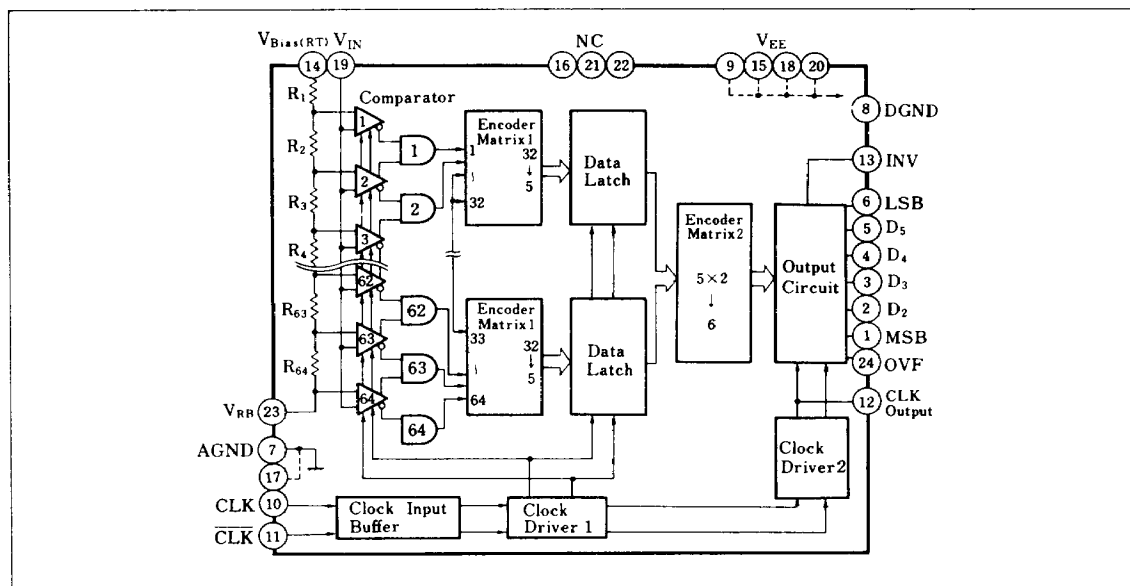
Main Characteristics ($V_{EE} = -5.2V$, $T_a = 0 \sim 70^\circ C$)

Item	Symbol	Condition	Value	Unit
Resolution	RES		6	bit
Input Dynamic Range	$V_{i(max)}$		2	V
Linearity Error	LE	$V_{IN} = 2V_{P-P}$	$\pm \frac{1}{2}$	LSB
Max. Conversion Speed	$f_{MSPS(max)}$		35	MSPS

Pin

Pin No.	Pin Name	Pin No.	Pin Name
1	1 st bit (MSB)	13	Output Inversion
2	2nd bit	14	Ref. High Level
3	3rd bit	15	V_{EE}
4	4th bit	16	NC
5	5th bit	17	Analog GND
6	6th bit (LSB)	18	V_{EE}
7	Analog GND	19	Analog Input
8	Digital GND	20	V_{EE}
9	V_{EE}	21	NC
10	Clock Input (Positive)	22	NC
11	Clock Input (Negative)	23	Ref. Low Level
12	Clock Output	24	Over Flow Output

■ Block Diagram



■ Absolute Maximum Ratings (Ta=25°C)

Item	Symbol	Rating	Unit
Supply Voltage	V_{EE}	$-7 \sim +0.5$	V
Analog Input Voltage	V_i	$V_{EE} \sim +0.5$	V
Digital Input Voltage	V_{ϕ}	$V_{EE} \sim +0.5$	V
Reference Voltage	V_{REF}	$V_{EE} \sim +0.5$	V
Power Dissipation	P_D	500	mW
Operating Ambient Temperature	T_{opr}	$0 \sim +70$	°C
Storage Temperature	T_{stg}	$-50 \sim +150$	°C

■ Recommended Operating Conditions

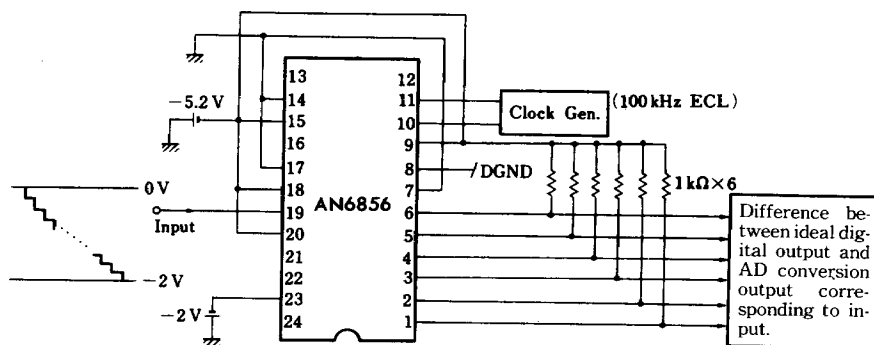
Item	Symbol	min.	typ.	max.	Unit
Supply Voltage	V_{EE}	-5.4	-5.2	-5.0	V
Reference Voltage	$V_{REF(OUT)}$	-0.1	0	+0.1	V
	$V_{REF(REF)}$	-2.1	-2.0	-1.9	V
Analog Input Voltage	V_i	-2.1		+0.1	V
Digital Input Voltage	$V_{\phi H}$	-1.105			V
	$V_{\phi L}$			-1.475	V
Digital Output current	I_{OH}	-5	-2	-1	mA
Clock Input Pulse Width (Clock Input)	τ_H	10			ns
	τ_L	20			ns

INV pin is available when $V_{\phi H} = 0V$ or $V_{\phi L} = \text{Open}$.

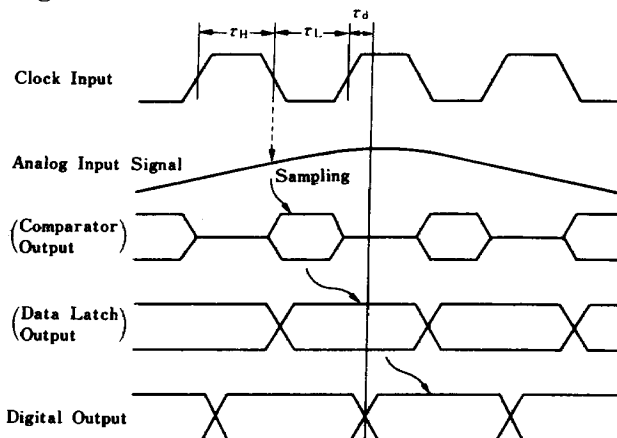
■ Electrical Characteristics ($V_{EE} = -5.2V$, $T_a = 25^\circ C$)

Item	Symbol	Test Circuit	Condition	min.	typ.	max.	Unit
Supply Current	I_{EE}		$V_{EE} = -5.2V$		45	65	mA
Reference Resistance Current	$I_{Bias(RT)}$		$V_{RT} = 0V$		12.5	20	mA
	$I_{Bias(RB)}$		$V_{RB} = -2V$	-20	-12.5		mA
Equivalent Input Impedance	R_i		$V_{EE} = -5.2V$	40			k Ω
Input Capacitance	C_i		Total V_{IN}		25	40	pF
Input Bias Current	I_{Bias}		$V_{EE} = -5.2V$		45	90	μA
Clock Input Current	$I_{\phi H}$		I_{36} when $V_{36} = 0V$, I_{37} when $V_{37} = -5.2V$			+0.6	mA
	$I_{\phi L}$		I_{36} when $V_{36} = -5.2V$, I_{37} when $V_{37} = -5.2V$	-0.01			mA
Digital Output Voltage	V_{OH}		$V_{EE} = -5.2V$, $I_{OH} = -2mA$	-0.96			V
	V_{OL}		$V_{EE} = -5.2V$, $I_{OH} = -2mA$			-1.65	V
Digital Output Delay Time	τ_d				10	15	ns
Linearity Error	LE	1				$\pm \frac{1}{2}$	LSB

■ Test Circuit 1



■ Sampling Timing Chart

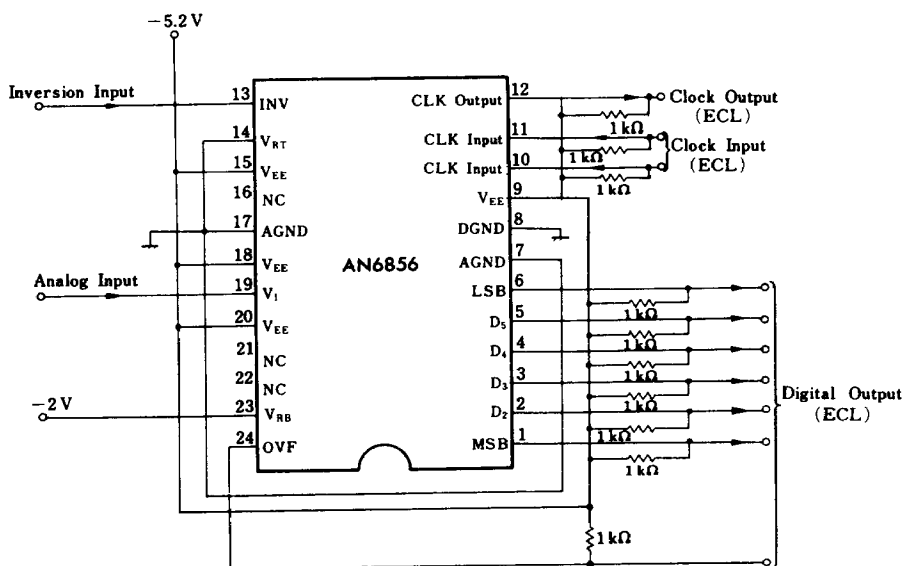


Note : Because the comparator output and data latch output are internal signals, the external pin is not provided.

Output Code Table

Comparator No.	Comparator Threshold Voltage		Digital Output											
	Input 2.0000V FS 31.25mV STEP	Input 1920mV FS 30mV STEP	INV. Pin "L" Over M L Flow 1 2 3 4 5 6						INV. Pin "H" Over M L Flow 1 2 3 4 5 6					
001	-0.0312V	-0.0300V	0	0	0	0	0	0	1	1	1	1	1	1
002	-0.0625	-0.0600	0	0	0	0	0	1	1	1	1	1	1	0
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
031	-0.9687	-0.9300	0	0	1	1	1	1	0	0	0	0	0	1
032	-1.0000	-0.9600	0	0	1	1	1	1	1	0	0	0	0	0
033	-1.0312	-0.9900	0	1	0	0	0	0	0	1	0	1	1	1
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
063	-1.9687	-1.8900	0	1	1	1	1	1	0	1	0	0	0	0
064	-2.0000	-1.9200	0	1	1	1	1	1	1	1	0	0	0	0
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
063	-1.9687	-1.8900	0	1	1	1	1	1	1	1	0	0	0	0
064	-2.0000	-1.9200	1	1	1	1	1	1	1	1	0	0	0	0

External Connection Diagram (Example)



Note : It is recommended to separate the analog GND and digital GND on the print board.