

# AN6856

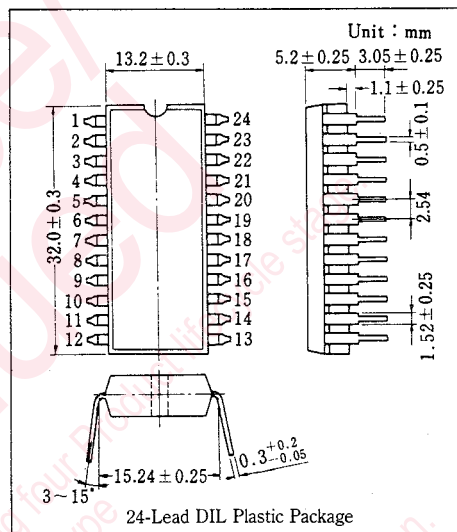
## High Speed 6-bit AD Converter

### Outline

The AN6856 is an A/D-converting parallel 6-bit monolithic bipolar IC with a high speed and low power consumption. It is suitable for high-speed data conversion such as video band signal digitizing, etc., and computer input data conversion.

### Features

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



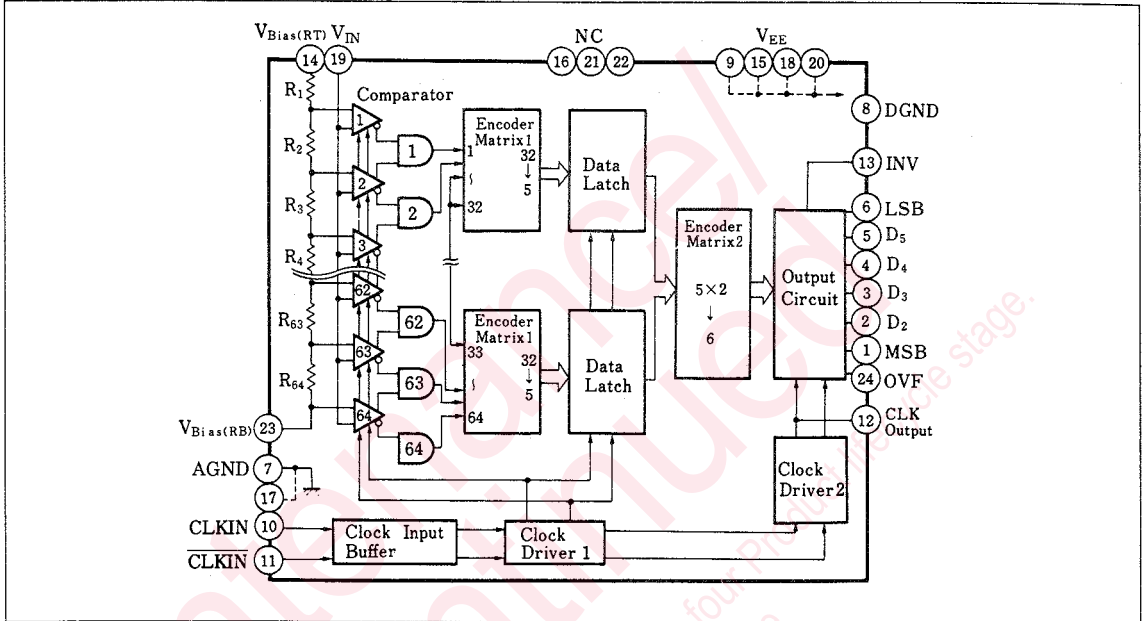
### Quick Reference Data ( $V_{EE} = -5.2V$ , $T_a = 0 \sim 70^\circ C$ )

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	1st 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 <sub>EE</sub>	-7 ~ +0.5	V
Analog input voltage	V <sub>i</sub>	V <sub>EE</sub> ~ +0.5	V
Digital input voltage	V <sub>φ</sub>	V <sub>EE</sub> ~ +0.5	V
Reference voltage	V <sub>REF</sub>	V <sub>EE</sub> ~ +0.5	V
Power dissipation	P <sub>D</sub>	500	mW
Operating ambient temperature	T <sub>opr</sub>	0 ~ +70	°C
Storage temperature	T <sub>stg</sub>	-50 ~ +150	°C

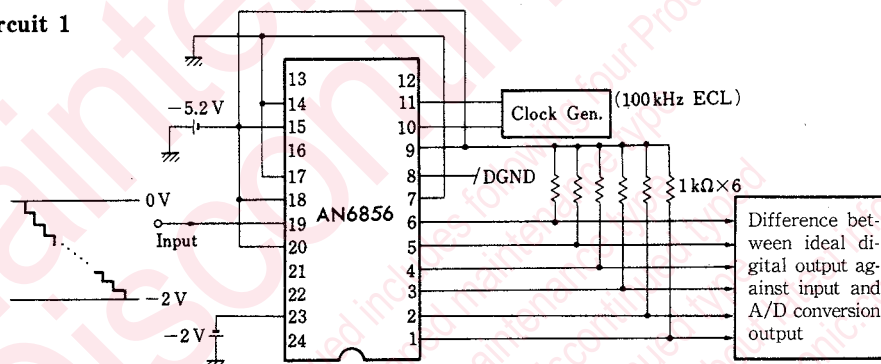
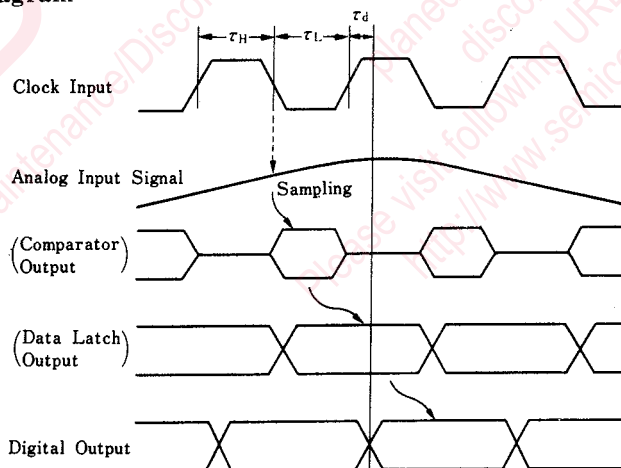
■ Recommended Operating Conditions

Item	Symbol	min.	typ.	max.	Unit
Supply voltage	V <sub>EE</sub>	-5.0	-5.2	-5.4	V
Reference voltage	V <sub>REF(RT)</sub>	-0.1	0	+0.1	V
	V <sub>REF(RB)</sub>	-1.9	-2.0	-2.1	V
Analog input voltage	V <sub>i</sub>	+0.1		-2.1	V
Digital input voltage	V <sub>φH</sub>	-1.105			V
	V <sub>φL</sub>			-1.475	V
Digital output current	I <sub>OH</sub>	-1	-2	-5	mA
Clock input pulse width (Clock Input)	τ <sub>H</sub>	10			ns
	τ <sub>L</sub>	20			ns

INV terminal also acceptable even when V<sub>φH</sub>=OV, V<sub>φL</sub>=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
	$I_{Bias(RB)}$		$V_{RB} = -2V$		-12.5	-20	mA
Equivalent input impedance	$R_i$		$V_{EE} = -5.2V$	40			k $\Omega$
Input capacitance *1	$C_i$		Total of $V_{IN}$		25	40	pF
Input bias current *1	$I_{Bias}$		$V_{EE} = -5.2V$		45	90	$\mu A$
Clock input current	$I_{\phi H}$		$I_{36}$ when $V_{36} = 0V$ , $I_{37}$ when $V_{37} = 0V$			+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	$\tau_d$				10	15	ns
Linearity error	LE	1				$\pm \frac{1}{2}$	LSB

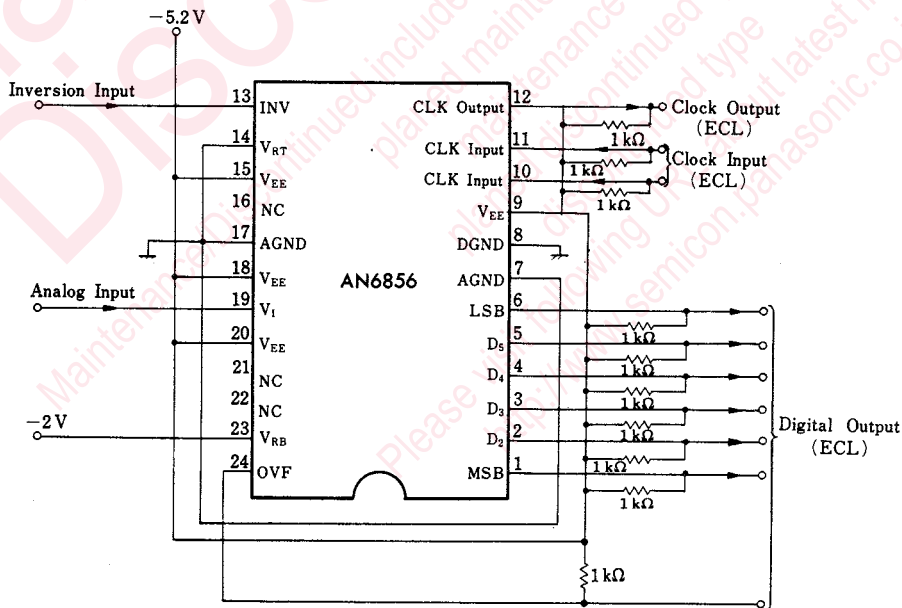
**■ Test Circuit 1**

**■ Sampling Diagram**


Note) There are no external terminals for comparator output and data latch output, because they are internal signals.

■ Output Cord Table

Comparator No.	Comparator Threshold Voltage		Digital Output														
	Input 2.0000 V FS 31.250 mV <sub>STEP</sub>	Input 1920 mV FS 30 mV <sub>STEP</sub>	INV. terminal "L" Over M L Flow 1 2 3 4 5 6					INV. terminal "H" Over M L Flow 1 2 3 4 5 6									
001	-0.0312V	-0.0300V	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1
002	-0.0625	-0.0600	0	0	0	0	0	0	0	1	1	1	1	1	1	0	
⋮	⋮	⋮	0	0	0	0	0	0	1	0	1	1	1	1	1	0	
⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	
031	-0.9687	-0.9300	0	0	1	1	1	1	1	0	1	1	0	0	0	0	1
032	-1.0000	-0.9600	0	0	1	1	1	1	1	1	1	1	0	0	0	0	0
033	-1.0312	-0.9900	0	1	0	0	0	0	0	0	1	0	1	1	1	1	1
⋮	⋮	⋮	0	1	0	0	0	0	0	1	1	0	1	1	1	1	0
⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	
063	-1.9687	-1.8900	0	1	1	1	1	1	1	0	1	0	0	0	0	0	1
064	-2.0000	-1.9200	0	1	1	1	1	1	1	1	1	0	0	0	0	0	0
			1	1	1	1	1	1	1	1	0	0	0	0	0	0	0

■ External Connection Diagram



Note) Separate Analog GND and Digital GND from each other on the printed circuit board as much as possible.

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