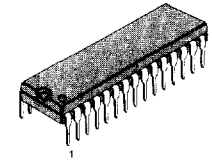
HIGH SPEED A/D CONVERTER

The KAD0206 is a monolithic 6-bit flash type ADC in which the 2μm bipolar process is applied. Signal transformation up to 20 MSPS is available in the device and it is also ideal for converting wide band analog signals into digital signals.

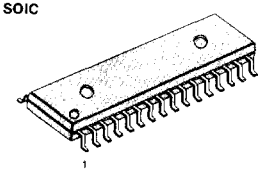
The device has three different clamping functions. Also the range of optional external circuits can be easily modified into the input dynamic range. Each clamping stage supplements the keyed clamping function and peak clamping function which can be selected according to its use.

Since the device has a large input resistance and small analog input capacitance, the input signal can be directly processed without a buffer. Moreover, in order to simplify the application circuit, two different bandgap references are provided for the top and the bottom of the resistor string. The output data enable function guarantees easy applications of this data converter.

30 SDIP



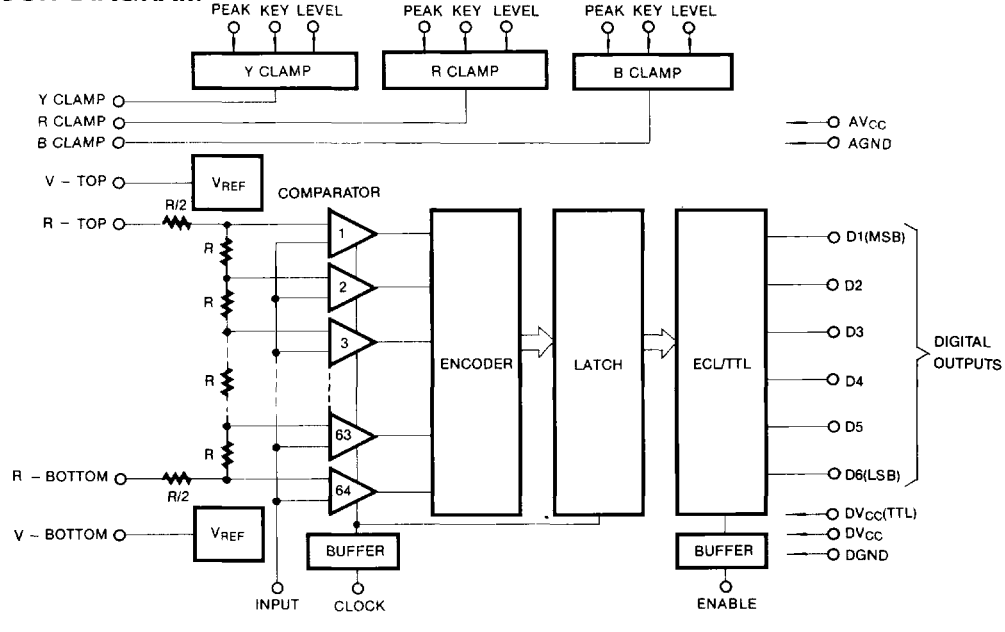
32 SOIC



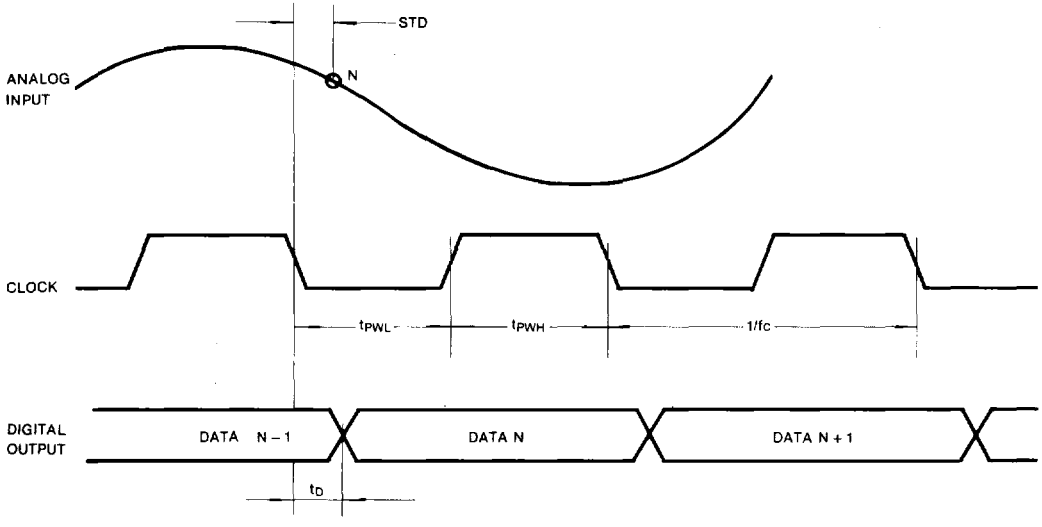
FEATURES

- **Resolution: 6-bit**
- **Linearity error: under ± 1/2 LSB**
- **Maximum conversion rate: 20 MSPS**
- **Input full power bandwidth: 6 MHz**
- **Analog input dynamic range: 2.6V – 5.0V**
- **Clamp range: 2.6V – 3.7V**
- **Clock, enable, key pulse: TTL, CMOS compatible**
- **Data output level: TTL**
- **Single power supply: 5 ± 0.25V**
- **Low power dissipation: 400 mW (typ.)**
- **Data out enable: Active high or open**
- **Keyed clamp pulse input: Active high**
- **Pipe line delay: 0 clock**
- **Built-in 3.7V, 2.7V bandgap reference circuit**
- **Package: 30 SDIP 32 SOIC**

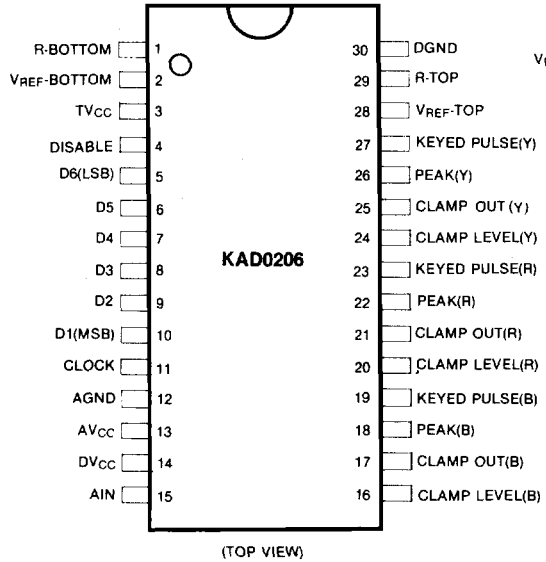
BLOCK DIAGRAM



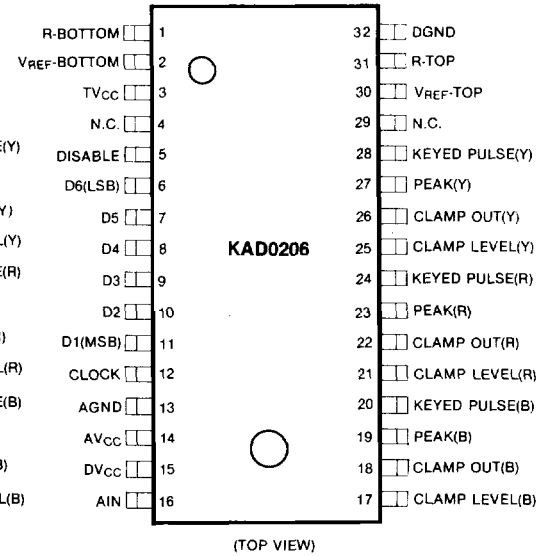
TIMING DIAGRAM



PIN CONFIGURATION



(TOP VIEW)
30 SDIP



(TOP VIEW)
32 SOIC

ABSOLUTE MAXIMUM RATINGS (Ta = 25°C)

Characteristics	Symbol	Value	Unit
Supply Voltage	V_{CCA}, V_{CCD}	−0.5 to 6.0	V
Supply Difference	$V_{CCA} - V_{CCD}$	−0.5 to 0.5	V
Digital Input Voltage	V_{DIN}	−0.5 to 6.0	V
Reference Voltage Difference	$V_{RT} - V_{RB}$	−1.5 to 1.5	V
Reference Voltage	V_{RT}, V_{RB}	2.5 to 6.5	V
Digital Output Current (Low)	I_{OL}	6	mA
Digital Output Current (High)	I_{OH}	2	mA
Ambient Operating Temperature Range	T_a	−25 ~ 95	°C
Storage Temperature Range	T_{stg}	−55 ~ 125	°C

Notes: 1. Absolute maximum ratings are limiting values applied individually, while all other parameters are within specified operating conditions.
2. Functional operation under any of these conditions in not implied.
3. Applied voltage must be current limited to a specified range.
4. Current is specified as positive when flowing into the device.

RECOMMENDED OPERATING CONDITIONS

Characteristics	Symbol	Min	Typ	Max	Unit
Supply Voltage	V_{CCA}, V_{CCD}	4.75	5.0	5.25	V
Supply Difference	$V_{CCA} - V_{CCD}$	−0.05	0	0.05	V
Reference Voltage Difference	$V_{RT} - V_{RB}$	0.8	1.0	1.2	V
Analog Input Voltage	V_{AIN}	V_{RB}	—	V_{RT}	V
Top Reference Voltage	V_{RT}	3.6	3.7	5.25	V
Bottom Reference Voltage	V_{RB}	2.6	2.7	4.45	V
Clock High Time	t_{PWH}	25			ns
Clock Low Time	t_{PWL}	25			ns
Digital Input Voltage, Low	V_{IL}			0.8	V
Digital Input Voltage, High	V_{IH}	2.0			V
Clamp Level Range	V_{clamp}	2.60		3.70	V
Peak Clamp Enable Resistor	R_{peak}	3.3	3.9	5	Kohm
Ambient Operating Temperature Range	T_a	0		70	°C
Digital Output Current, Low	I_{OL}			4	mA
Digital Output Current, High	I_{OH}			−0.4	mA

D.C. ELECTRICAL CHARACTERISTICS WITHIN SPECIFIED CONDITIONS

Characteristics	Symbol	Test Condition	Min	Typ	Max	Unit
Supply Current	$I_{CCD} + I_{CCA}$	V_{CC} = Max	75	85	95	mA
Reference Current	I_{REF}	$V_{RT} - V_{RB}$ = 1V		5	8	mA
Reference Resistor	R_{REF}	Ta = 25°C	140	200	260	ohm
Analog Input Equivalent Resistor	R_{AIN}	$V_{AIN} = V_{RT}$	100			Kohm
Analog Input Capacitance	C_{AIN}	$V_{AIN} = V_{RT}$		30	60	pF
Analog Input Current	I_{AIN}	V_{CC} = Max, $V_{AIN} = V_{RT}$		40	70	μA
Digital Input Current, Low	I_{IL}	V_{CC} = Max, V_I = 0.4V		− 100	− 400	μA
Digital Input Current, High	I_{IH}	V_{CC} = Max, V_I = 2.4V		100	200	μA
Digital Maximum Input Current	I_{IM}	V_{CC} = Max, V_I = 5.25V			500	μA
Output Voltage, High	V_{OH}	V_{CC} = Min, I_{OH} = Max	2.7			V
Output Voltage, Low	V_{OL}	V_{CC} = Min, I_{OL} = 3mA			0.4	V
Clamp Level Input Current 1	$I_{CLAMP}(1)$	V_{LEVEL} = 3.0V, Key = 'H'		10	30	μA
Clamp Level Input Current 2	$I_{CLAMP}(2)$	V_{LEVEL} = 3.0V, Key = 'L'		20	40	μA
Keyed Clamp Out Level Difference	$\triangle V_{CLAMP}$	V_{LEVEL} = 3.0V, Key = 'H'	− 100	0	100	mV
Bottom Bandgap Reference Voltage	V_{BTM}	Ta = 25°C	2.6	2.7	2.8	V
Top Bandgap Reference Voltage	V_{TOP}	Ta = 25°C	3.6	3.7	3.8	V
Reference Voltage Variation	$\triangle(V_T - V_B)$	Ta = 0°C ~ 70°C			28	mV

A.C. ELECTRICAL CHARACTERISTICS WITHIN SPECIFIED CONDITIONS

Characteristics	Symbol	Test Condition	Min	Typ	Max	Unit
Maximum Conversion Rate	f_C	V_{CC} = Min			20	MSPS
Sampling Time Offset	t_{STD}	V_{CC} = Min			20	ns
Digital Output Delay	t_D	V_{CC} = Min			20	ns

PERFORMANCE CHARACTERISTICS WITHIN SPECIFIED CONDITIONS

Characteristics	Symbol	Test Condition	Min	Typ	Max	Unit
Differential Linearity Error	E_{LD}	V_{CC} = Typ			± 0.8	%
Integral Linearity Error	E_{LI}	V_{CC} = Typ			± 0.8	%
Full-Power Input Bandwidth	BW	f_C = Max			6	MHz
Top Offset Error	E_{OT}	$V_{AIN} = V_{RT}$			50	mV
Bottom Offset Error	E_{OB}	$V_{AIN} = V_{RB}$			− 50	mV
Differential Gain	DP	f_C = 4 fsc			2	°C
Differential Phase	DG	f_C = 4 fsc			2	%

APPLICATION CIRCUIT