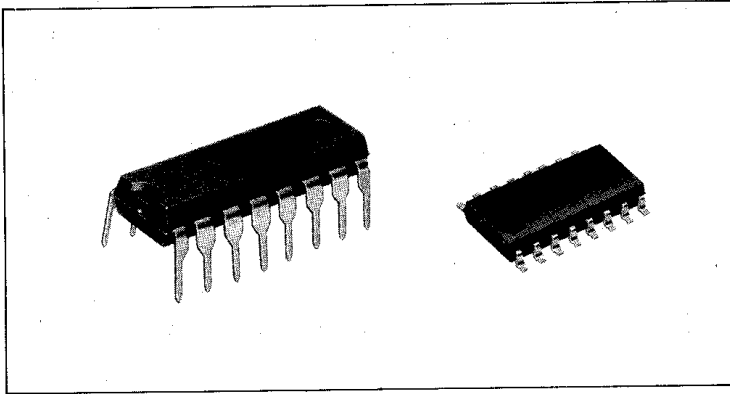
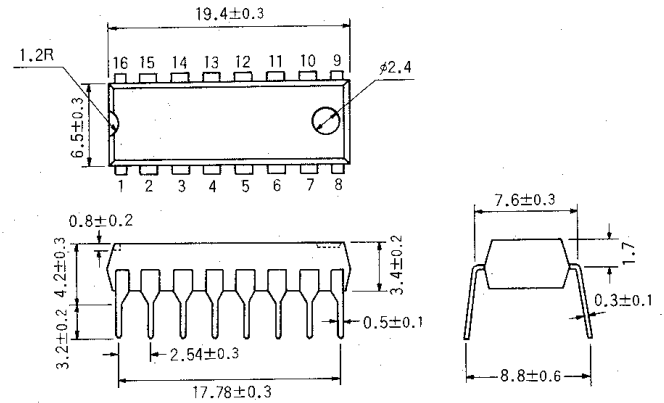


**Velocity Servo**  
**BA6302A/BA6303**



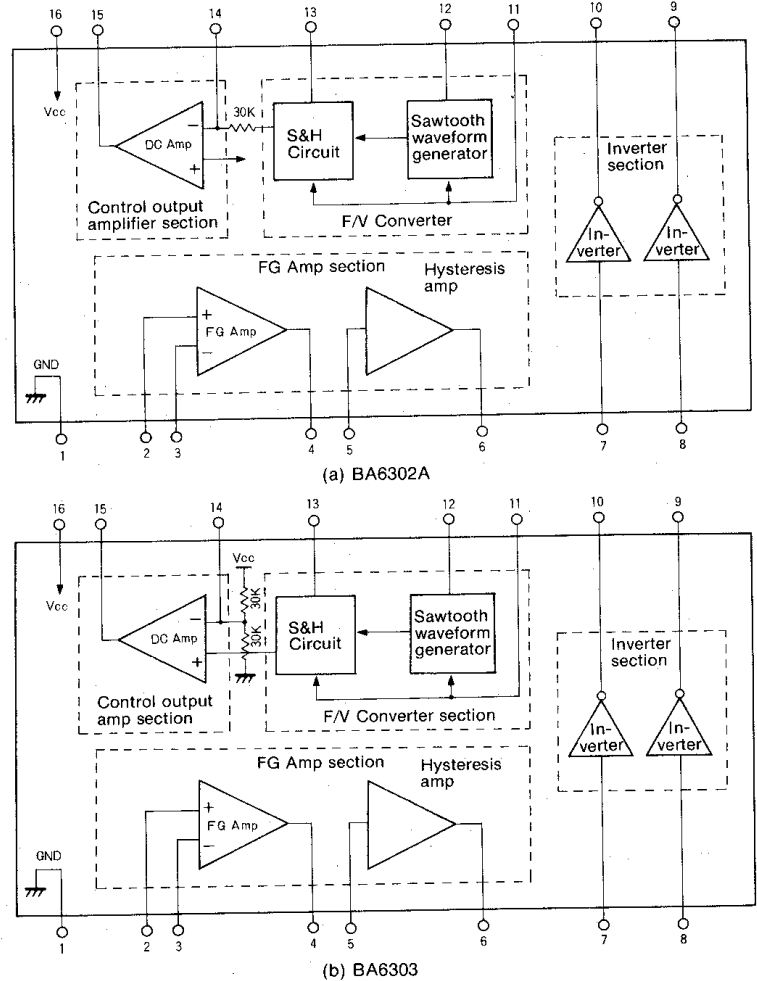
**Dimensions (mm)**



**Fig. 1** Note: A mini-flat packaged type is also available upon request.

The BA6302A/BA6303 is a monolithic integrated circuit consisting of a sample and hold type F/V converter section, FG amplifier with hysteresis section, an error amplifier section, and an inverter section. Speed setting for motor control is achieved using externally connected RC constants, to allow a high level of freedom in setting the speed. To achieve stable start-up characteristics, a built-in high-speed start-up circuit is used. By connecting a program counter to the FG amplifier output and F/V converter input, several types of motors can be speed controlled using a program.

**Block Diagrams**



**Features**

1. Highly stable speed control is used with externally connected RC speed-setting components. A sample and hold F/V converter is used.
2. An FG amplifier with hysteresis is used to enable high noise immunity.
3. A built-in start-up circuit is used to achieve both high speed and high stability at start-up.
4. By using an FG program counter, multi-step speed control is possible.
5. Low power consumption ( $V_{CC} = 9V$ ,  $I_{CC} = 2.3mA$ , typical)
6. Operates stably on 5V, 9V, or 12V supply.
7. Two inverters are used for flexibility.

**Applications**

1. VTR Capstan motor speed control
2. VTR Drum motor speed control
3. VTR Reel motor speed control
4. Other motor speed control applications

**Fig. 2**

## Absolute Maximum Ratings ( $T_a = 25^\circ\text{C}$ )

Parameter	Symbol	Limits	Unit
Supply voltage	$V_{CC}$	15	V
Power dissipation	$P_d$	450	mW
Operating temperature	$T_{opr}$	-20~+60	$^\circ\text{C}$
Storage temperature	$T_{stg}$	-55~+125	$^\circ\text{C}$
Inverter circuit load current	$I_L$	10	mA

\* Derating is done at 4.5mW/ $^\circ\text{C}$  for operation above  $T_a = 25^\circ\text{C}$ .

## Electrical Characteristics (Unless otherwise noted, $T_a = 25^\circ\text{C}$ , $V_{CC} = 9.0\text{V}$ )

Parameter	Symbol	Min	Typ	Max	Unit	Conditions
Supply voltage	$V_{CC}$	4.5	—	13.0	V	
Supply current	$I_{CC}$	1.6	2.3	3.0	mA	

### FG Amplifier section

FG Amp DC bias voltage	$V_{FGB}$	1.1	1.3	1.5	V	
FG Amp base bias current	$I_{bb1}$	—	80	320	nA	
FG Amp open-loop voltage gain	$A_{VO1}$	65	75	—	dB	$R_{FG} = 1\text{M}\Omega$
FG Amp output level	$V_{FGO}$	2.0	2.6	3.0	$V_{p-p}$	$R_{FG} = 100\text{k}\Omega$
Hysteresis comparator bias current	$I_{bb1}$	—	600	1200	nA	
Central hysteresis voltage	$V_{hym}$	1.1	1.3	1.5	V	
Hysteresis width	$V_{hyw}$				mV	
Hysteresis amplifier output level	$V_{hyo}$	6.5	7.3	—	$V_{p-p}$	$R_L = 10\text{k}\Omega$

### F/V Conversion section

F/V Conversion output temperature coefficient	$\Delta V_{FVT}$	—	160	—	ppm/ $^\circ\text{C}$	$V_{FVO} = 4.5\text{V}$
F/V Conversion output drift	$\Delta V_{FVO}$	—	0	—	mV	$V_{FVO} = 4.5\text{V}$
Pin 12 base current	$I_{bb3}$	—	25	100	nA	
Pin 13 base current	$I_{bb4}$	—	15	00	nA	
F/V Conversion efficiency	$\Delta FV$	—	30	—	mV/Hz	$C_T = 0.1\mu\text{F}$ $R_T = 120\text{k}\Omega$ $FG = 100\text{Hz}$

### Control output amplifier section

DC Amp open-loop gain	$G_{VO2}$	49	55	—	dB	
Central bias voltage	$V_B$	4.2	4.6	5.0	V	
DC Amp output level	$V_{DCO}$	6.1	6.3	—	$V_{p-p}$	$R_F = 30\text{k}\Omega$ $R_L = 10\text{k}\Omega$

### Inverter circuit

Input threshold voltage	$V_T$	1.5	—	3.5	V	
Input impedance	$R_{IN}$	20	30	—	$\text{k}\Omega$	
Output saturation voltage	$V_{SAT}$	—	0.2	0.3	V	$R_L = 10\text{k}\Omega$ $V_{IN} = V_{CC}$
Output leakage voltage	$I_L$	—	0	1	$\mu\text{A}$	$V_{CE} = 13.0\text{V}$ $V_{IN} = 0\text{V}$