

# FG system speed servo controller

## BA6302A/BA6302AF/BA6303/BA6303F

The BA6302A and BA6303 are FG-system servo control ICs suitable for controlling the speed of VCR motors. They contain a hysteresis FG amplifier section, an S/H system F/V conversion section, an error amplifier section, and an inverter section.

Motor speed can be set with a high degree of freedom by an external CR. The start-up circuit allows quick and precise motor starting.

Motor speed can be controlled precisely at different levels by installing an FG program counter between the FG amplifier output and the F/V conversion input.

### ●Applications

Speed control of various motors including capstan motors, drum head motors, and reel motors

### ●Features

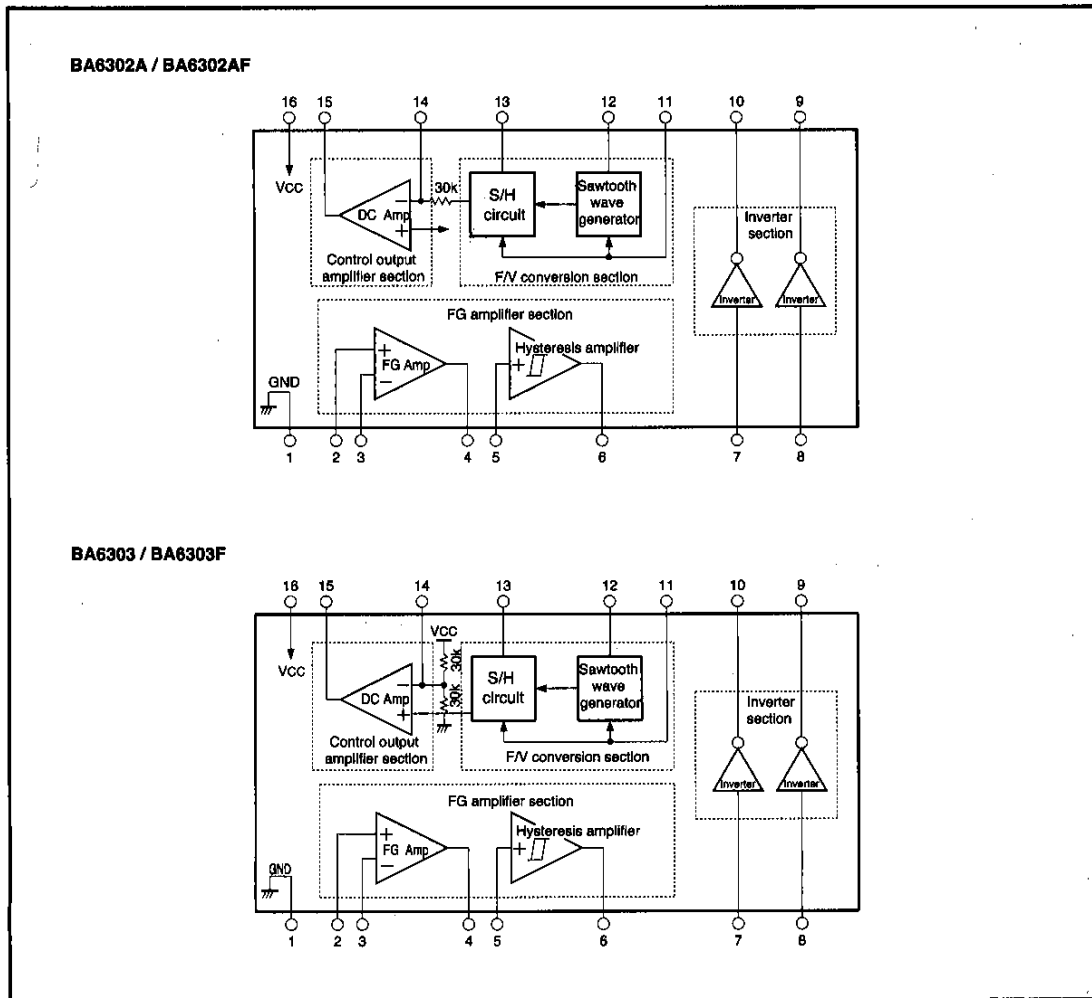
- 1) S/H system F/V converter allows speed setting with a stable external CR.
- 2) High hysteresis FG amplifier with high noise resistance.
- 3) Start-up circuit allows quick and precise motor starting.
- 4) Motor speed can be controlled at different levels by installing an FG program counter.
- 5) Low power consumption. ( $V_{CC}=9V$ ,  $I_0=2.3mA$  Typ.)
- 6) Stable operation with either 5, 9, or 12V supply voltage.
- 7) Two versatile inverters are built in.

### ●Absolute maximum ratings ( $T_a=25^\circ C$ )

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

\* Reduce power by 4.5 mW for each degree above 25 $^\circ C$ .

●Block diagram



●Electrical characteristics (Unless otherwise noted, Ta=25°C, Vcc=9V)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions	
Operating supply voltage	V <sub>CC</sub>	4.5	—	13.0	V	—	
Quiescent current	BA6302A / AF	I <sub>Q</sub>	1.7	2.6	3.4	mA	—
	BA6303 / F		1.4	2.3	3.1		
< FG amplifier section >							
DC bias potential	V <sub>FB</sub>	1.1	1.3	1.5	V	—	
Base bias current	I <sub>bb1</sub>	—	80	320	nA	—	
Open loop voltage gain	A <sub>VO1</sub>	65	75	—	dB	R <sub>FG</sub> =1MΩ	
Output level	V <sub>FQD</sub>	2.0	2.6	3.0	V <sub>P-P</sub>	R <sub>FG</sub> =100kΩ	
Hysteresis comparator bias current	I <sub>bb2</sub>	—	600	1200	nA	BA6302A / BA6302AF ; I <sub>bb1</sub>	
Mid-hysteresis voltage accuracy	ΔV <sub>hym</sub>	-140	-60	+30	mV	Difference electric potential from pin3	
Potential difference with reference to pin 3	V <sub>hyw</sub>	40	60	80	mV	—	
Hysteresis amplifier output level	V <sub>hyo</sub>	6.5	7.3	—	V <sub>P-P</sub>	R <sub>L</sub> =10kΩ	
< FV conversion section >							
Output temperature coefficient	ΔV <sub>FVT</sub>	—	160	—	ppm / °C	V <sub>FVO</sub> =4.5V	
Output drift	ΔV <sub>FVO</sub>	—	0	—	mV	V <sub>FVO</sub> =4.5V	
Pin-12 base current	I <sub>bb3</sub>	—	25	100	nA	—	
Pin-13 base current	I <sub>bb4</sub>	—	15	60	nA	—	
Conversion efficiency	ΔFV	—	30	—	mV / Hz	R <sub>T</sub> =120kΩ C <sub>T</sub> =0.1 μF F <sub>c</sub> =100Hz	
< Control output amplifier section >							
DC amplifier open loop gain	G <sub>VO2</sub>	49	55	—	dB	—	
Mid-bias voltage	V <sub>B</sub>	4.2	4.6	5.0	V	—	
DC amplifier output level	BA6302A / AF	V <sub>CCO</sub>	6.1	6.3	—	R <sub>DC</sub> =∞, R <sub>L</sub> =20kΩ	
	BA6303 / F		—	—			
< Inverter circuit >							
Input threshold voltage	V <sub>TH</sub>	1.5	—	3.5	V	—	
Input impedance	R <sub>IN</sub>	20	30	—	kΩ	—	
Output saturation voltage	V <sub>SAT</sub>	—	0.2	0.3	V	R <sub>L</sub> =10kΩ, V <sub>IN</sub> =V <sub>CC</sub>	
Output leakage voltage	I <sub>L</sub>	—	0	1	μA	V <sub>CE</sub> =13.0V, V <sub>IN</sub> =0V	

● External dimensions (Units: mm)

