FG system speed servo controller

BA6301 / BA6301F / BA6321

The BA6301, BA6301F, and BA6321 are single package servo control ICs suitable for controlling the speed of VCR motors. The ICs contain an F / V conversion section for speed control, a hysteresis amplifier section for waveform shaping, and an MIX amplifier section for speed / phase control output. They are compatible with either phase lagging or phase leading servo by setting the MIX system according to the phase servo control and MDA. They provide stable and efficient operation with either 5, 9, or 12V supply voltage. Motor speed can be controlled precisely at different levels with an FG program counter.

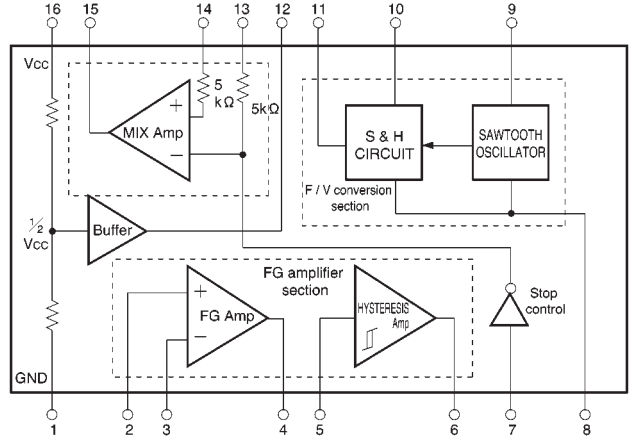
●Applications

Speed control of capstan motors, drum head motors, reel motors, cassette players, and record players

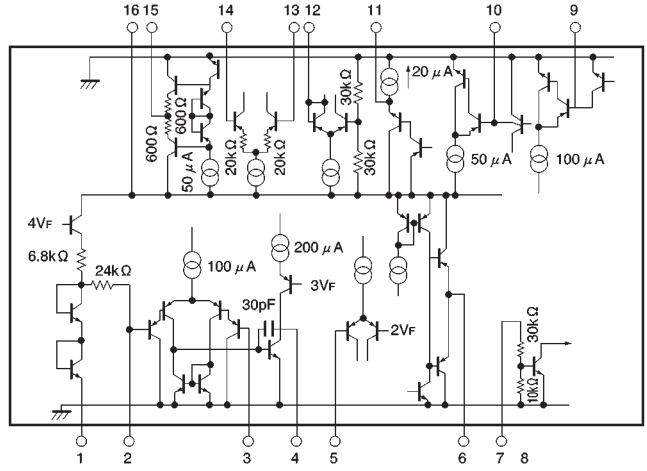
●Features

1) Motor speed can be controlled by an FG program counter.
2) S / H type F / V converter allows servo control of various FG frequencies (BA6301 / F or BA6321 is used for f_C greater or less than 600Hz, respectively)
3) Quick and precise motor starting.
4) Low current dissipation.
5) Wide range of operating voltage.
6) Limited number of external components.

●Block diagram



●Internal circuit configuration



●Absolute maximum ratings (Ta = 25°C)

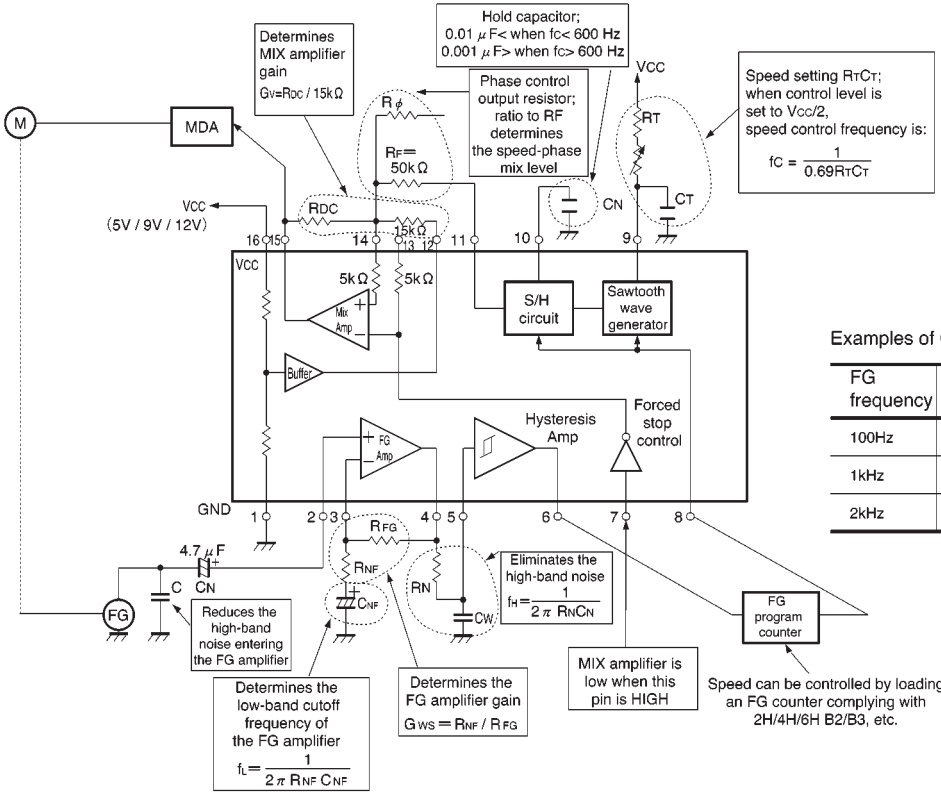
Parameter	Symbol	Limits	Unit
Power supply voltage	V_{CC}	15	V
Power dissipation	Pd	450*	mW
Operating temperature	Topr	−20～+60	℃
Storage temperature	Tstg	−55～+125	℃

* Reduced by 4.5 mW for each increase in Ta of 1℃ over 25℃.

●Electrical characteristics (unless otherwise noted, Ta = 25°C, V_{CC}=9V)

Parameter		Symbol	Min.	Typ.	Max.	Unit	Conditions
Operating voltage		V_{CC}	4.5	−	13.0	V	−
Quiescent current		Io	1.1	2.2	4.4	mA	−
FG amplifier section	Open loop voltage gain	G_{vo1}	65	73	−	dB	R_{FG}=100kΩ
	Output level	V_{FGO}	2.0	2.6	−	V_{P-P}	−
	Mean-hysteresis voltage	V_{hyM}	−130	−60	0	mV	Electric potential difference from pin3
	Hysteresis voltage width	V_{hyW}	30	70	110	mV	−
	Hysteresis amplifier output level	V_{hyO}	6.0	7.0	−	V_{P-P}	R_L=20kΩ
F / V converter section	Output temperature coefficient	ΔV_{FVT}	−	−2	−5	mV / ℃	V_{FVO}=4.5V
	Output drift	ΔV_{FVD}	−	−0.05	−0.1	% / ℃	V_{FVO}=4.5V
	Output level	V_{FVO}	−	7.5	−	V_{P-P}	R_L=∞
MIX amplifier section	Open loop voltage gain	G_{vo2}	50	60	−	dB	−
	Output level	V_{MIXO}	6.0	7.0	−	V_{P-P}	R_L=20kΩ
Mean-bias voltage		V_{Bias}	4.3	4.5	4.8	V	−
Forced stop control	Forced stop threshold	$V_{IN\ TH}$	1.0	2.0	3.0	V	V_{MIXO}＜1.0V
	Input resistance	R_{IN}	20	30	40	kΩ	−

●Application example



Examples of CH, CT, and RT combination

FG frequency	CH	CT	RT
100Hz	0.01 μF	473	270k
1kHz	1000pF	472	270k
2kHz	1000pF	332	180k

●Electrical characteristic curves

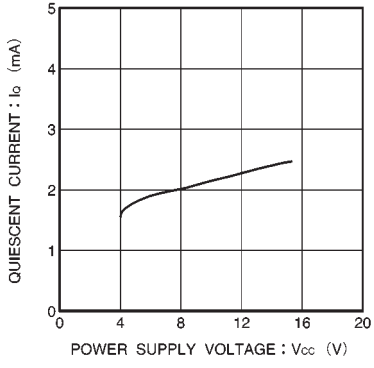


Fig.1 Quiescent current vs. power supply current

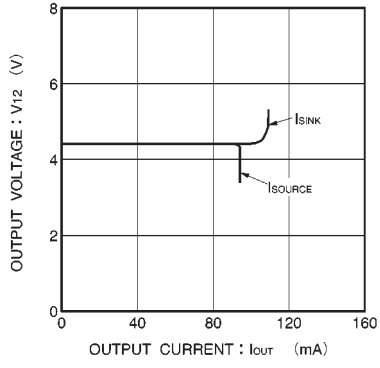


Fig.2 Pin-12 output voltagevs. output current

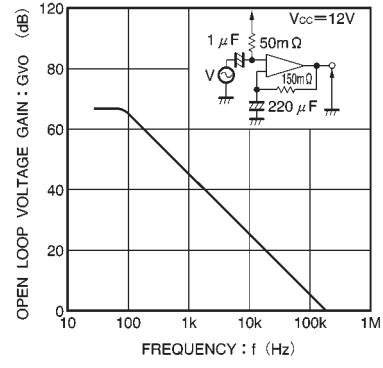


Fig.3 MIX amplifier open loop voltage gain vs. frequency

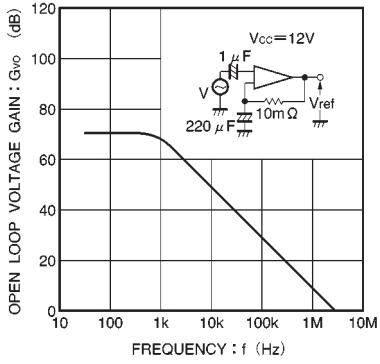


Fig.4 FG amplifier open loop voltage gain vs. frequency

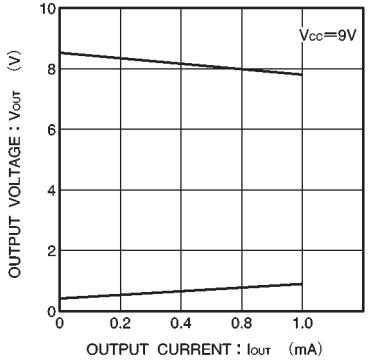


Fig.5 Hysteresis amplifier output voltage vs. output current

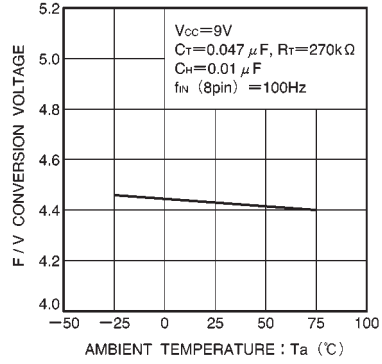
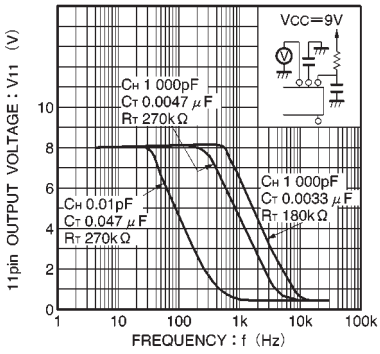


Fig.6 F / V conversion voltage temperature characteritic

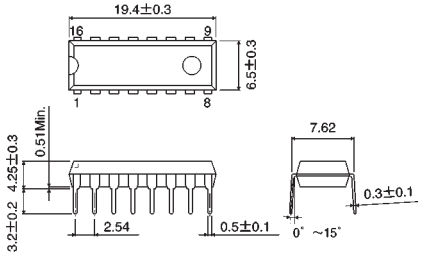


Note: current sink capacity of pin 11 is about 20 μA

Fig.7 F / V conversion characteritics (no load : pin11)

●External dimensions (Units: mm)

BA6301/BA6321



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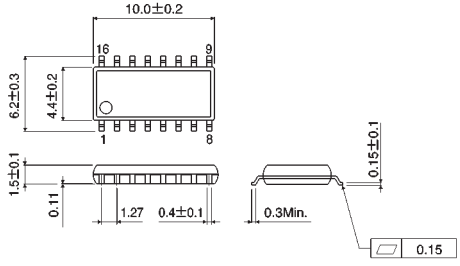
BA6301F



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