HA16670MP

Position Signal Generator

Description

The HA16670MP generates a position signal from the servo information from a hard disk.

A closed-loop servo controller can be implemented from a kit including the HA16671MP and HA16672MP VCM control ICs and the HA13447 VCM driver IC

Functions

- Servo signal buffer amplifier
- Peak hold
- Servo sink detect circuit
- Offset switch
- Op amp for filter design

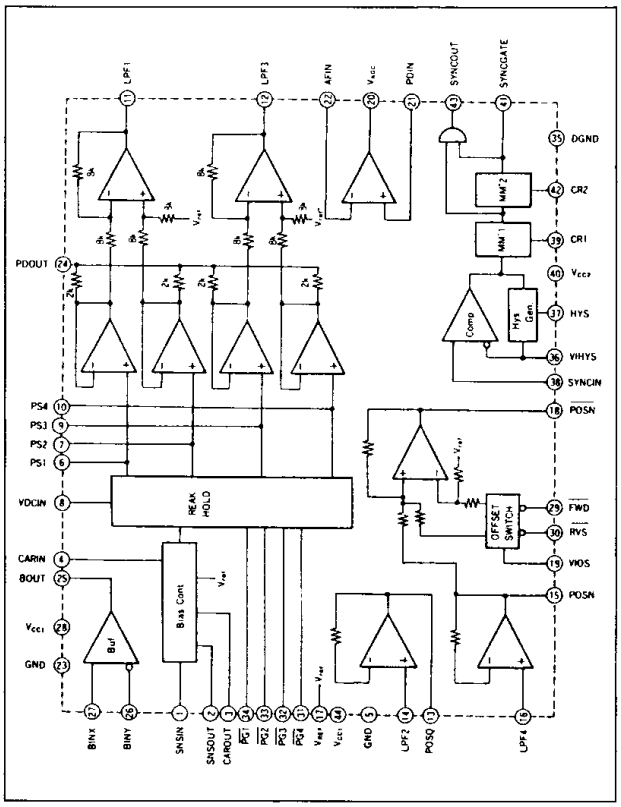
Features

- Two power supply design (+5 V, +12 V)
- TTL-compatible digital inputs and outputs
- High bandwidth buffer amplifier (40 MHz typ)

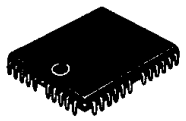
Ordering Information

Type No.	Package
HA16670MP	MP-44

Block Diagram

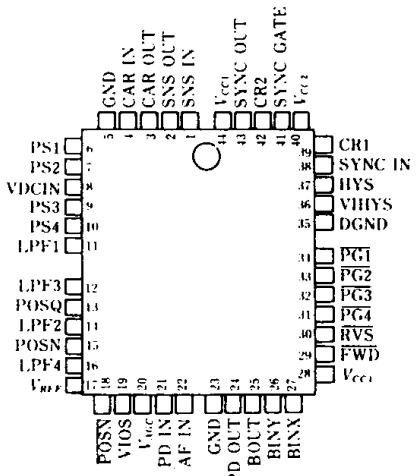


HA16670MP



(MP-44)

Pin Assignment



(Top View)

Pin Description

Type	Pin No.	Name	Function
Power supply	28, 44	V_{CC1}	+12-V power supply (analog)
	40	V_{CC2}	+5-V power supply (logic)
	5, 23	GND	Analog GND
	35	DGND	Logic GND for logic circuits
Inputs	17	V_{REF}	Reference voltage for peak hold and op amp
	27	BINX	Buffer amplifier servo differential signals
	26	BINY	
	4	CARIN	Bias control carrier signal
	1	SNSIN	Feedback for bias control
	34	$\overline{PG1}$	Peak hold gate control
	33	$\overline{PG2}$	Low: On = signal enable
	32	$\overline{PG3}$	High: Off = signal disable
	31	$\overline{PG4}$	
	21	PDIN	Non-inverting op amp for AGC
	22	AFIN	Inverting op amp for AGC
	14	LPF2	Voltage follower
	16	LPF4	
	30	$\overline{RVS}$	Offset switch control
	29	$\overline{FWD}$	Low: On
			High: Off
	19	VIOS	Offset switch offset voltage
	36	VIHYS	Hysteresis comparator amplitude control
	38	SYNCIN	Hysteresis comparator servo signal
Outputs	25	BOUT	Buffer amplifier
	3	CAROUT	Bias control carrier
	2	SNSOUT	Bias control feedback
	24	PDOUT	Peak hold output additive signal
	20	V_{AGC}	AGC amplifier control voltage
	11	LPF1	Peak hold 1 and 2 differential amplifiers
	12	LPF3	Peak hold 3 and 4 differential amplifiers
	13	POSQ	Voltage follower for quadratic filter
	15	POSN	
	18	$\overline{POSN}$	Inverted POSN plus offset switch
	37	HYS	Hysteresis comparator voltage waveform monitor
	41	SYNCGATE	MM#2 output pulsewidth monitor
	43	SYNCOUT	Sync pulse
External Components	6	PS1	Peak hold capacitor
	7	PS2	
	9	PS3	
	10	PS4	
	8	VDCIN	Resistor for setting peak hold discharge current
	39	CR1	Resistor and capacitor for setting MM#1 output pulsewidth
	42	CR2	Resistor and capacitor for setting MM#2 output pulsewidth

Absolute Maximum Ratings (Ta = 25°C)

Parameter	Symbol	Rating	Unit	Applicable Pins
Power supply voltage 1	V_{CC1}	15.0	V	V_{CC1}
Power supply voltage 2	V_{CC2}	7.0	V	V_{CC2}
Input voltage 1	V_{I1}	V_{CC2}	V	$\overline{PG1}$–$\overline{PG4}$, $\overline{FWD}$, $\overline{RVS}$
Input voltage 2	V_{I2}	V_{CC1} – 1.5	V	LPF2, LPF4, PDIN, AFIN
Output current	I_O	2	mA	LPF1, POSQ, LPF3, POSN, $\overline{POSN}$, V_{AGC}
Operating temperature	T_{opr}	0 to +70	°C	
Storage temperature	T_{stg}	–55 to +125	°C	

The absolute maximum ratings are limiting values, to be applied individually, beyond which the device may be permanently damaged. Functional operation under any of these conditions is not guaranteed. Exposing a circuit to its absolute maximum rating for extended periods of time may affect the device's reliability.

Electrical Characteristics

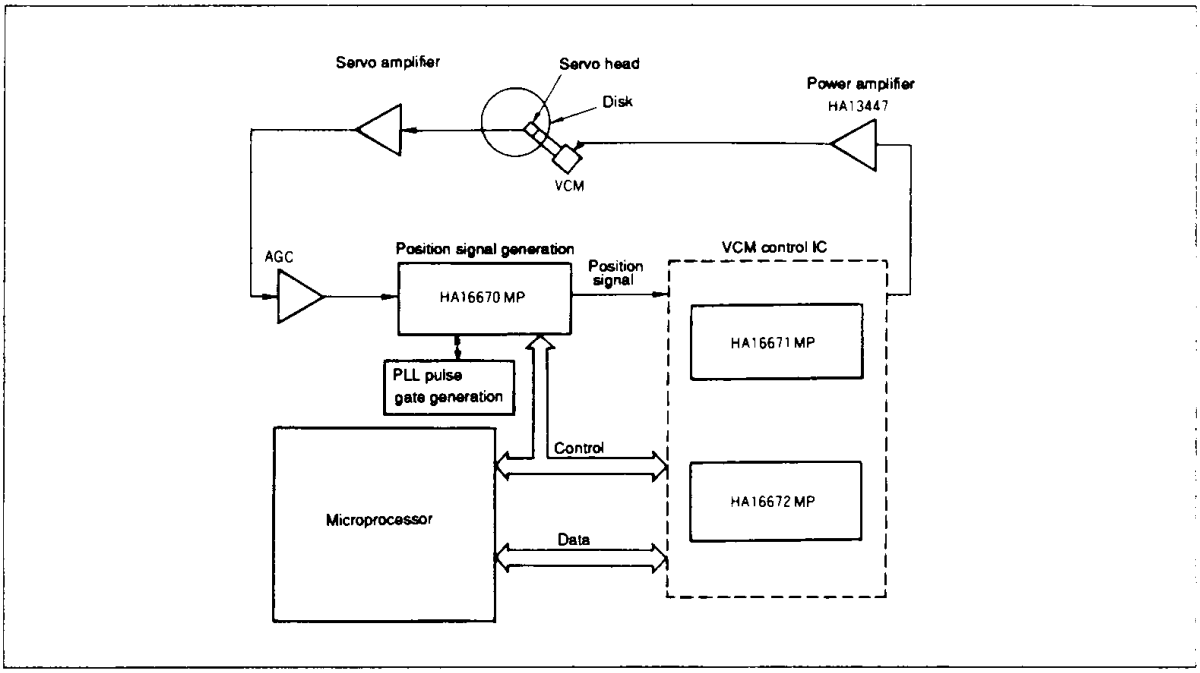
(V_{CC} = 12.0 V, V_{CC2} = 5.0 V, Ta = 25°C, unless otherwise specified)

Parameter		Symbol	Min	Typ	Max	Unit	Test Conditions	Notes
Power supply	Operating voltage 1	V_{CC1}	10.8	12.0	13.2	V		
	Operating voltage 2	V_{CC2}	4.5	5.0	5.5	V		
	Current consumption 1	I_{CC1}	14	25	40	mA	V_{CC1} = 13.2 V V_{CC2} = 5.5 V	
	Current consumption 2	I_{CC2}	19.5	31.2	46.0	mA	V_{CC1} = 13.2 V V_{CC2} = 5.5 V	
Buffer amplifier	Input bias voltage	V_{BB}	3.5	3.8	4.15	V		
	In-phase output voltage	V_{CMB}	8.9	9.3	9.7	V		
	Output sink current	I_{OSB}	0.55	1.0	1.85	mA	$V_C = V_{CC1}$ + 4 V $V_{IB} = V_{CC1}$	
	Voltage gain	A_{VB}	4.3	5.0	5.6	V/V	f = 500 kHz	
	Bandwidth	BW	—	40	—	MHz	V_{IN} = 200 mV_{p-p}, –0.5 dB	
Bias circuit	Input bias current	I_{BR}	—	90	450	nA		
	Input bias voltage	V_{IR}	5.4	5.7	6.0	V	V_{REF} = 5.0 V	
	Voltage gain	A_{VR}	—	105	—	dB		2
Peak hold	Output offset voltage	V_{OSP}	30	100	250	mV		
	Output clamp voltage	V_{OCL}	2.65	3.1	3.55	V		
Op amp	Input offset current	I_{IO}	—	1	200	nA		1
	Input offset voltage	V_{IO}	—	0.1	9.0	mV		1
	In-phase input voltage	V_{CM}	1.6	—	8.4	V		1
	In-phase output voltage	V_{OCM}	1.6	—	8.4	V		1
	Slew rate	SR	—	2.6	—	V/µs		1
Sync pulse generator	Monostable multivibrator pulsewidth 1	T_{W1}	—	56.5	—	ns	R_{T1} = 56 Ω, R_{T2} = 2.2 kΩ C_{T1} = 120 pF, C_{T2} = 150 pF V_{IN4} = 2V_{p-p}, f = 3 MHz	
	Monostable multivibrator pulsewidth 2	T_{W2}	—	690	—	ns		
	Output fall time	t_f	—	4	—	ns		
	Output rise time	t_r	—	7	—	ns		

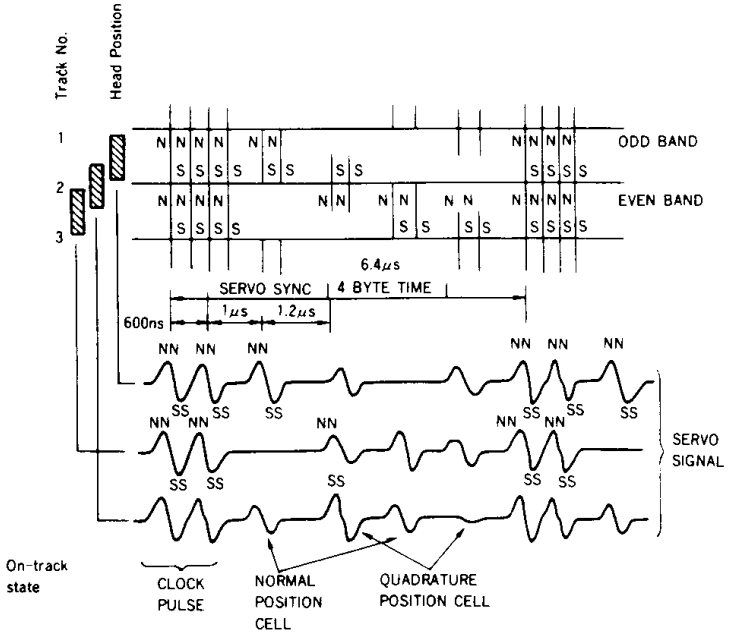
Notes:

1. Characteristic values of the op amps built into the HA16670MP.
2. Open-loop gain for the bias circuit op amp.

Sample Application



Servo Signal



Sample Circuit

