

M56733AFP**3-PHASE BRUSHLESS MOTOR CONTROL****DESCRIPTION**

The M56733AFP is a semiconductor integrated circuit designed as a single chip controller for the FDD spindle motor. The IC is equipped with a power amplifier, hole amplifier, FG amplifier, oscillator, speed discriminator, and various types of protection circuits.

Equipped with MOD pin that enables 3-speed switching with a single pin, the M56733AFP is very convenient to make system compact.

FEATURES

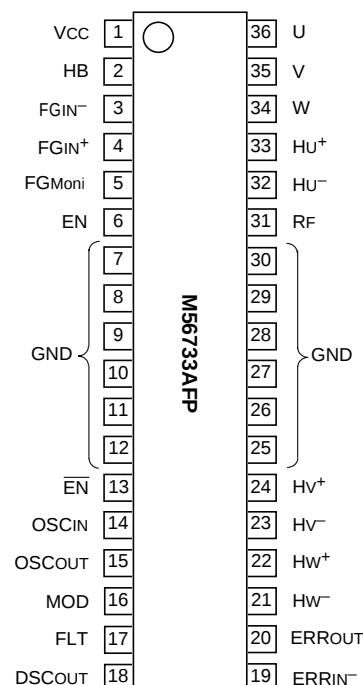
- Provided with digital servo enabling high precision, high stability and non-adjustment.
- 3-speed switching function with a pin MOD
- Enable two systems $\overline{\text{EN}} \cdot \overline{\text{EN}}$
- I_o (peak)=1.0A
- Low capacitance of dumping capacitor

APPLICATION

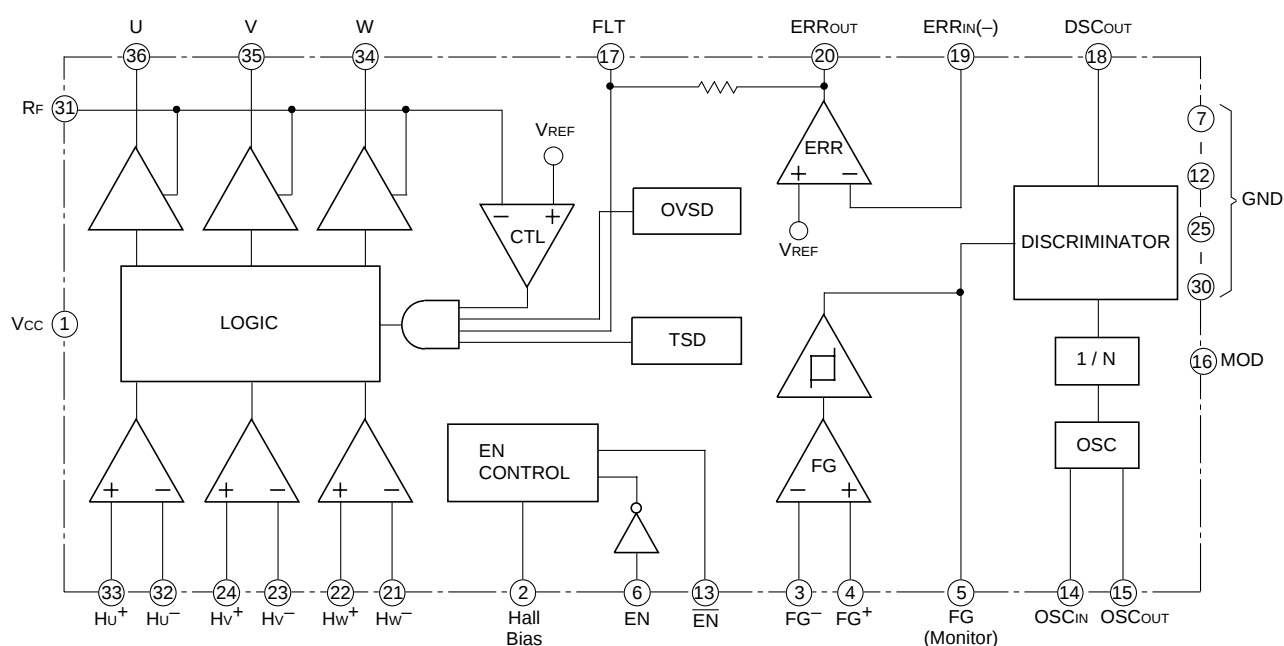
FDD spindle motor (5")

RECOMMENDED OPERATING CONDITIONS

Supply voltage 10.8 – 12.0 – 13.2 V
 Oscillation frequency 492 kHz
 Maximum output current 800 mA
 FG amplifier input signal level 5 mVp-p or more

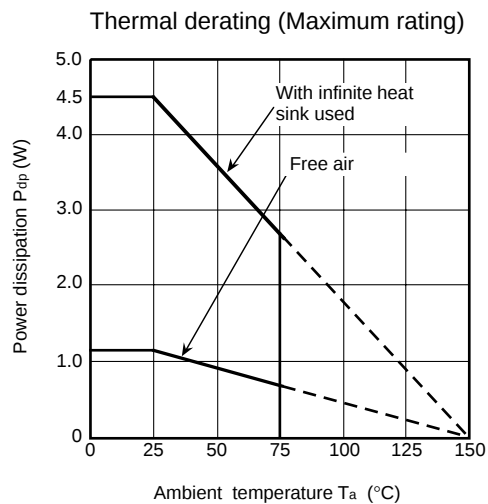
PIN CONFIGURATION (TOP VIEW)

Outline 36P2R-D

BLOCK DIAGRAM

ABSOLUTE MAXIMUM RATINGS (Ta=25°C)

Symbol	Parameter	Conditions	Ratings	Unit
V _{CC}	Supply voltage		15	V
I _O	Output current		1.0	A
V _{HD}	Hole amplifier, differential input voltage	Between 21 and 22, between 23 and 24, between 32 and 33 (pin number)	5	V
V _{IN}	Apply voltage at pin	6,13,21 – 24,32,33 (pin number)	0 – V _{CC}	V
f _{IN}	Clock frequency		1000	kHz
P _t	Power dissipation	Use of infinite heat sink	4.5	W
K _θ	Thermal derating	Use of infinite heat sink	27.8	°C/W
T _J	Temperature at junction		150	°C
T _{opr}	Operating temperature		-20 – 75	°C
T _{stg}	Storage temperature		-40 – 125	°C

TYPICAL CHARACTERISTICS

ELECTRICAL CHARACTERISTICS (Ta=25°C, Vcc=12V unless otherwise noted)

Symbol	Parameter	Test conditions	Limits			Unit
			Min.	Type.	Max.	
I _{ccH}	Circuit current	Except for injector current with circuit turned ON	9	18	28	mA
I _{ccL}	Circuit current	With circuit turned OFF	–	–	300	μA
I _{INHA}	Hole amplifier input current		–	0.4	4.0	μA
V _N	Phase output center voltage		5.1	6.3	7.1	V
ΔV _N	Center voltage difference between phases		–	–	0.2	V
V _{sat}	Output saturation voltage	I _o =0.7A, sum of upper and lower voltage	–	2.8	3.2	V
V _{TH}	Control input reference voltage	Voltage at FLT pin when output starts	1.05	1.20	1.35	V
G _V	Voltage gain between control input and output	Source side	16.65	18.05	25.10	dB
		Sink side	20.82	23.80	26.81	
		Source + Sink	26.00	28.00	30.00	
ΔG _V	Difference in voltage gain between phases		–	–	2	dB
V _{ref}	Error amplifier reference voltage	Measurement of mean level of discriminator output	2.0	2.2	2.4	V
I _{IN•E}	Error amplifier input current		-0.2	-0.02	–	μA
V _{O•E}	Error amplifier output level	Hi	2.2	2.5	3.1	V
		Lo	0.6	0.8	1.05	
V _{CL}	Current limit reference voltage	Voltage at RF pin when the voltage at FLT pin is lower than 1.5V.	0.36	0.40	0.44	V
V _{IN}	Function input threshold voltage	Hi	2.5	–	–	V
		Lo	–	–	1.0	
I _{IN}	Input current at function input pin	V _{IN} =12V 6pin	500	700	1000	μA
		V _{IN} =0V 13pin	-150	-100	-70	
V _{inj}	Voltage at injector pin	I _{inj} =6mA	0.6	0.9	1.5	V
V _{oDSC}	Discriminator output level	Hi	4.1	4.8	5.3	V
		Lo	0.5	0.8	1.2	
ΔT	Discriminator count error	+ for deceleration side, - for acceleration side fosc=492kHz	-6	1	6	μs
fosc	Oscillation frequency	fosc=492kHz	-0.2	–	0.2	%
I _{injMAX}	Maximum operating current of injector	fosc=492kHz	25	–	–	mA
I _{injMIN}	Minimum operating current of injector	fosc=492kHz	–	–	4	mA
VOLFG	FG amplifier output low level (monitor)	I _L =200μA	–	0.1	0.2	V
I _{lFG}	Leak current at FG amplifier output pin (monitor)	12V applied	–	–	1.0	μA
I _{INMOD}	Input current at MOD pin	12V applied	435	565	800	μA
		0V applied	-75	-98	-140	



- $X_1=492\text{kHz}$
(Oscillator)

4. Enable function

EN EN	Lo	Hi
Lo	DISABLE	ENABLE
Hi	DISABLE	DISABLE

Mode pin	FG synchronous frequency
Lo (MOD $\leq 0.8V$)	fosc/1640Hz
M (Open status)	fosc/820Hz
Hi (MOD $\geq 2.6V$)	fosc/(4100/3) Hz