

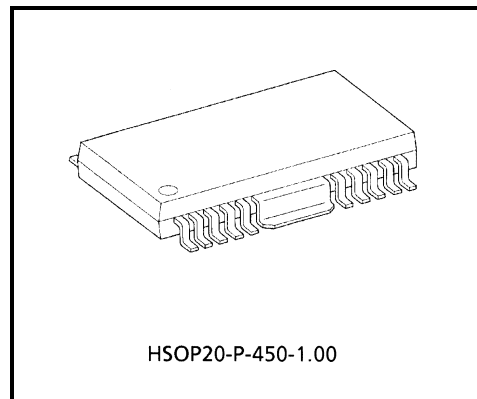
TA8424F

3 PHASE HALL MOTOR DRIVER IC

The TA8424F is non switching type 3 Phase Hall Motor Driver IC consisted of FG Amplifier, Regulator for Hall Sensors, control Amplifier and 3 Phase Output Drivers.

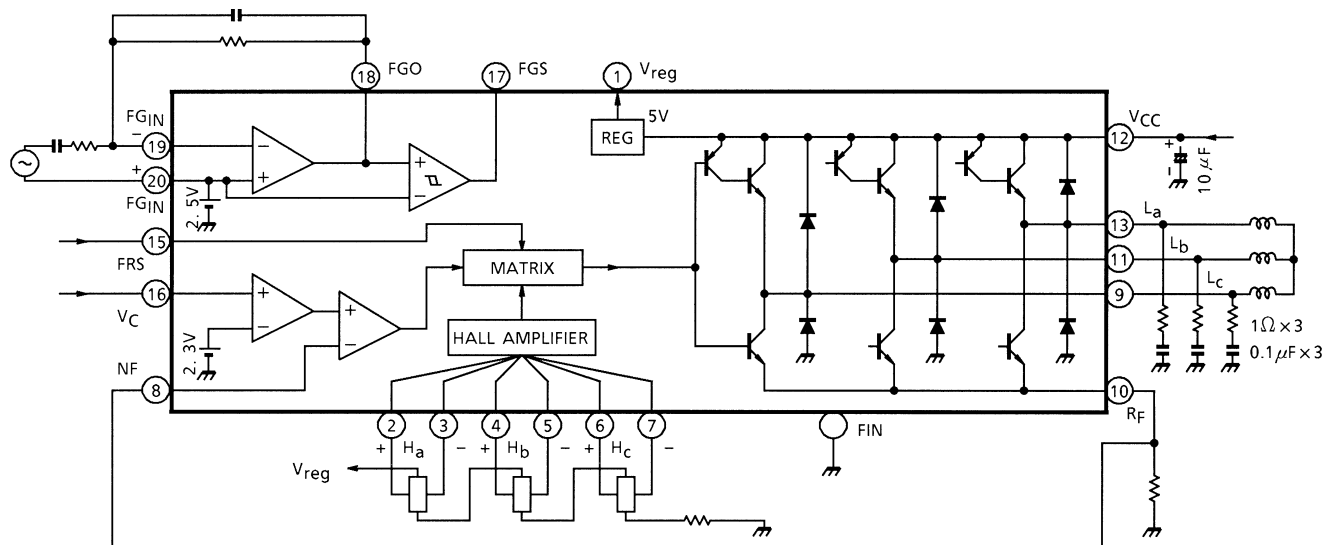
FEATURES

- Low Noise (Quasi Sinusoidal Drive), Current Control Motor Driver.
- Low Output Impedance with B Class Push-Pull Driver.
- Output Current Up to 1.2 A.
- Operating Voltage Range : $V_{CC} = 7\sim 17\text{ V}$
- Built-in Thermal Shutdown Circuit, FG Amplifier and Regulator.
- 2 Brake Modes Available (Short Brake and Dumping Brake).
- Build in regulator for Hall Sensors.



Weight : 0.79 g (Typ.)

BLOCK DIAGRAM



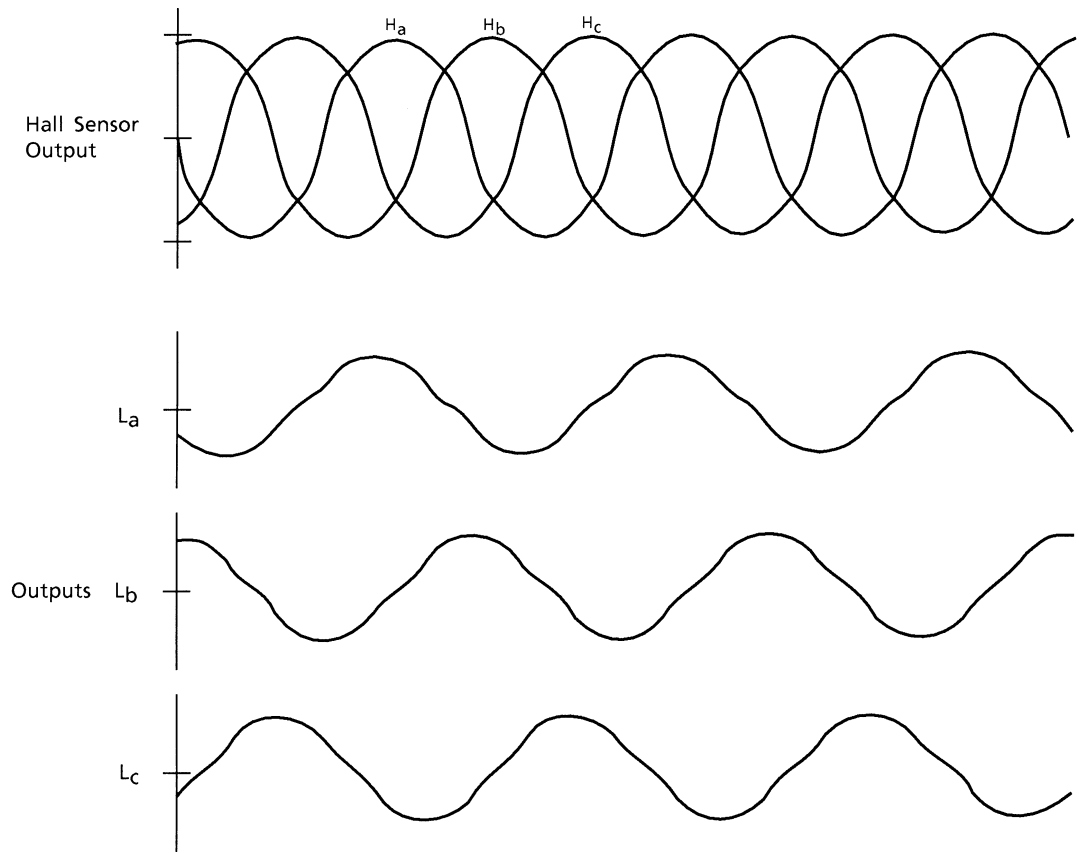
PIN FUNCTION

PIN No.	SYMBOL	FUNCTIONAL DESCRIPTION
1	V_{reg}	Internal power supply output terminal.
2	H_a^+	a-phase Hall-Amp positive input terminal.
3	H_a^-	a-phase Hall-Amp negative input terminal.
4	H_b^+	b-phase Hall-Amp positive input terminal.
5	H_b^-	b-phase Hall-Amp negative input terminal.
6	H_c^+	c-phase Hall-Amp positive input terminal.
7	H_c^-	c-phase Hall-Amp negative input terminal.
8	NF	Feedback resistance connection terminal.
9	L_c	c-phase drive output terminal.
10	R_F	Output current detection terminal.
11	L_b	b-phase drive output terminal.
12	V_{CC}	Power supply input terminal.
13	L_a	a-phase drive output terminal.
14	N.C.	Non connection.
15	FRS	Forward / Reverse control terminal.
16	V_C	Control signal input terminal.
17	FGS	Hysteresis Amp. output terminal.
18	FGO	FG Amp. output terminal.
19	FG_{IN}^-	FG Amp. negative input terminal.
20	FG_{IN}^+	FG Amp. positive input terminal.
	FIN	GND terminal.

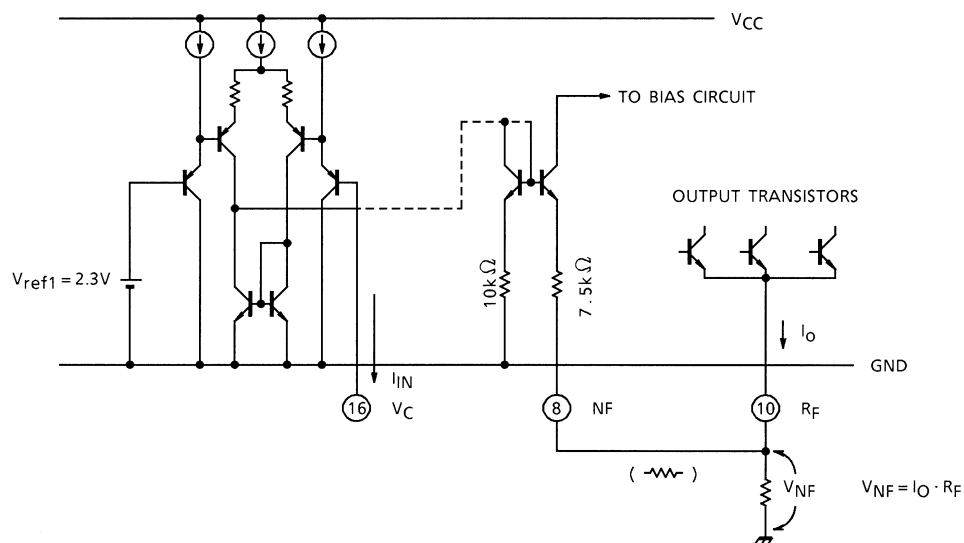
OPERATING MODE

MODE	FRS	V _C	OUTPUT
Forward	L	V _C > 2.3 V	L _a = H _a - H _b L _b = H _b - H _c L _c = H _c - H _a
Reverse	H	V _C > 2.3 V	L _a = - (H _a - H _b) L _b = - (H _b - H _c) L _c = - (H _c - H _a)
Stand-By	M	—	Center (Note)
Brake	—	V _C < 2.3 V	Center (Note)

Note: Low Impedance



1. Control Gain (G_{VCO})

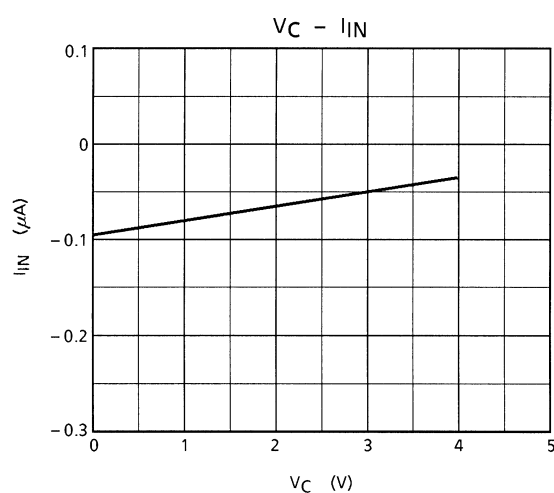


Negative Feedback is looped by R_F and connected its line to pin (8).

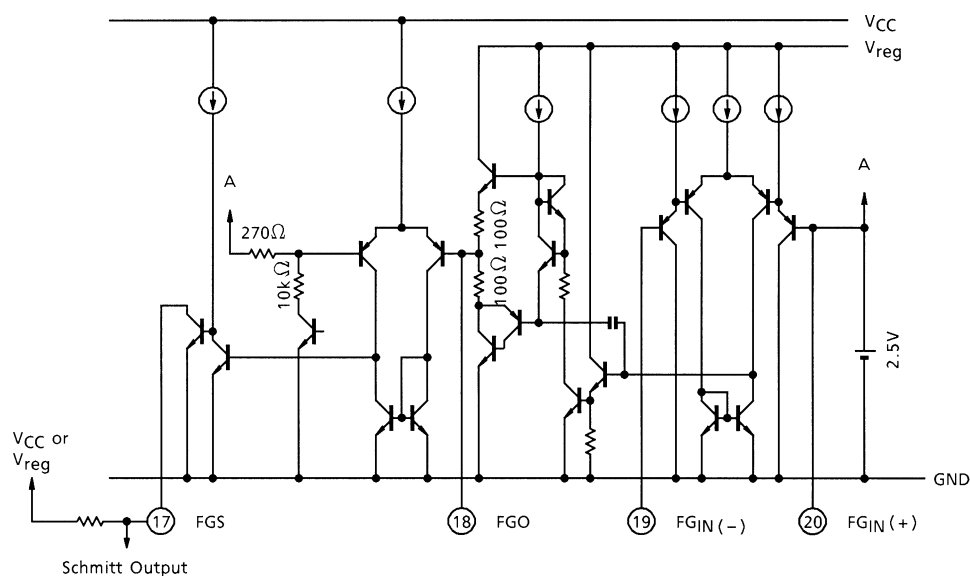
Feedback Voltage V_{NF} is generated by R_F and Output Current I_O .

It is possible to decrease the feedback by connecting a resistor between pin (10) and pin (8).

Input current of V_C ($I_{C\ IN}$) vs V_C characteristic is shown below.

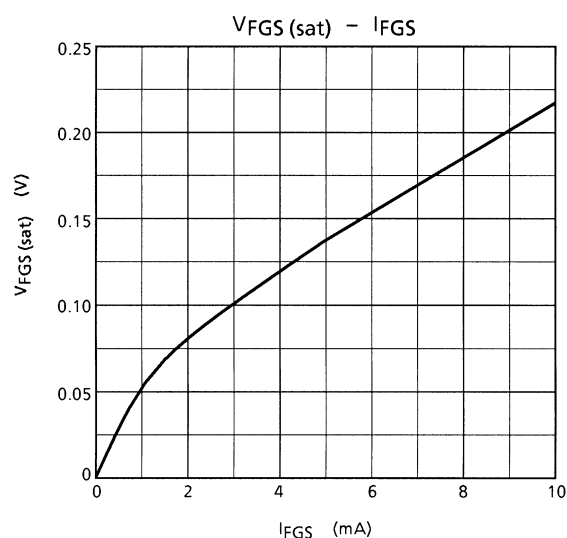


2. FG Amplifier and Hysteresis Amplifier

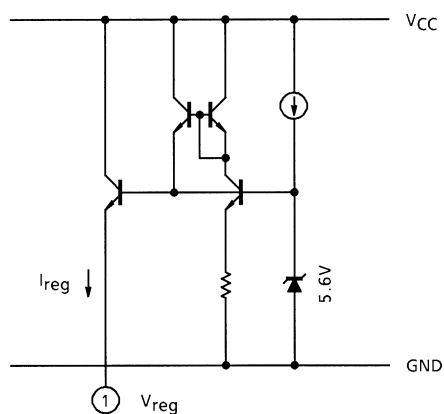


2.5 V of Internal Reference is equipped with FG Amplifier. FG signal is fed into FG_{IN+} and FG_{IN-} inputs with differential mode and outputs to FGO (Pin (18)).

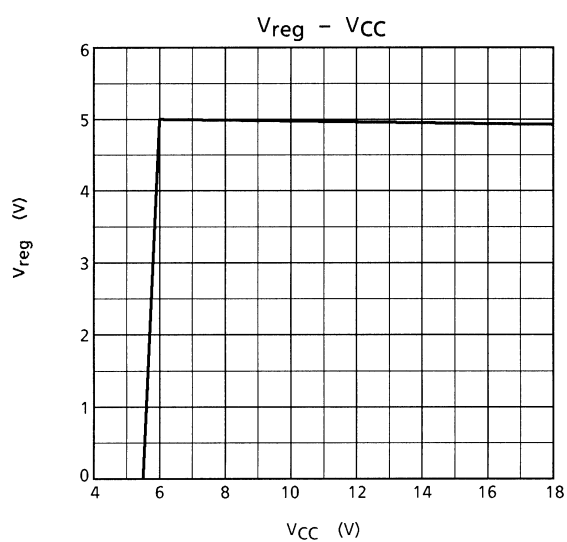
Amplified FG signal is wave shaped by Hysteresis Amplifier in following stage and outputs a wave shaped signal to FGS (Pin (17)).



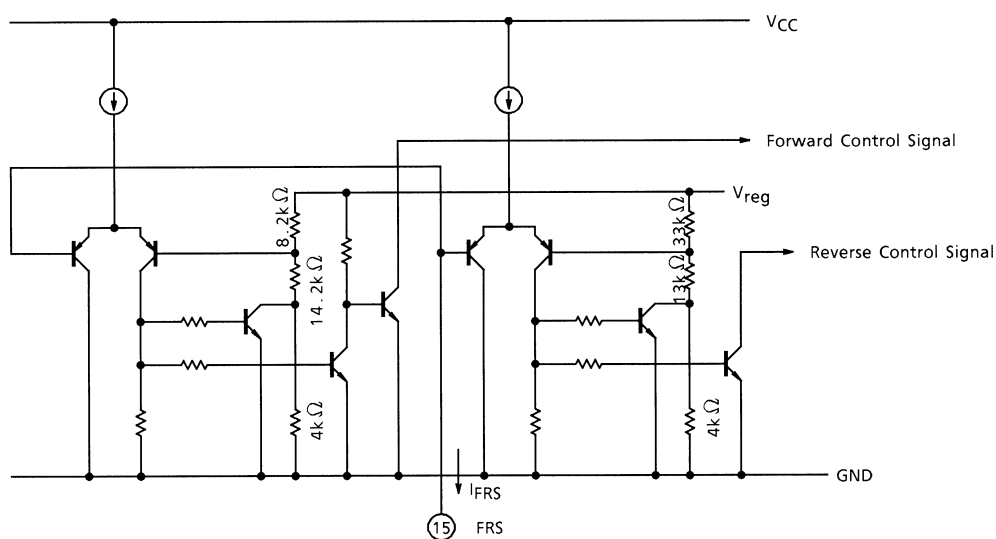
3. Regulator (V_{reg})



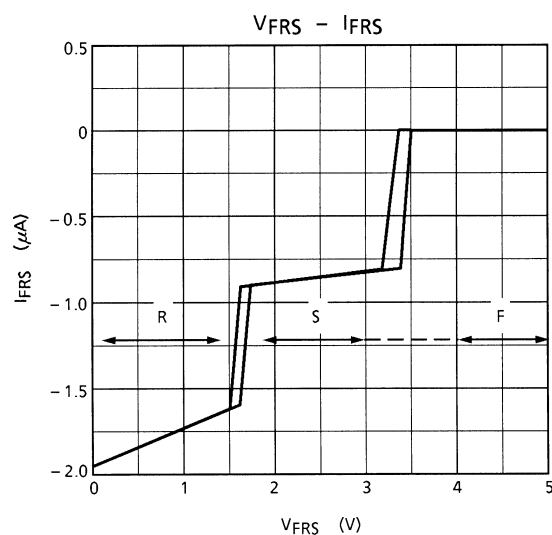
Internal regulator outputs 5 V and this current capability is up to 30 mA. V_{CC} vs V_{reg} characteristic is shown below.



4. FRS input (Rotation direction and stop control)



FRS input is a control terminal of Motor Rotation Direction and Stop.
 V_{FRS} vs I_{FRS} characteristic is shown below.



MAXIMUM RATINGS (Ta = 25°C)

CHARACTERISTIC	SYMBOL	RATING	UNIT
Supply Voltage	V _{CC}	18	V
Output Current (Average)	I _O (MAX.)	1.2	A
FG Output Current	I _{FGO}	12	mA
	I _{FGS}	14	
Power Dissipation	P _D	1.0 (Note 1)	W
		3.2 (Note 2)	
		5.8 (Note 3)	
Operating Temperature	T _{opr}	-30~75	°C
Storage Temperature	T _{stg}	-55~150	°C

Note 1: No Heat Sink

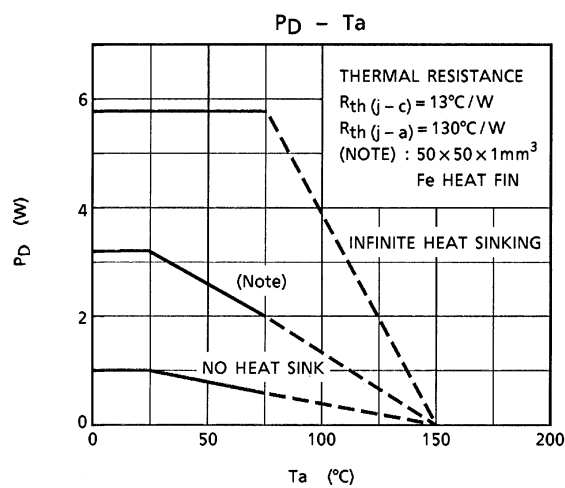
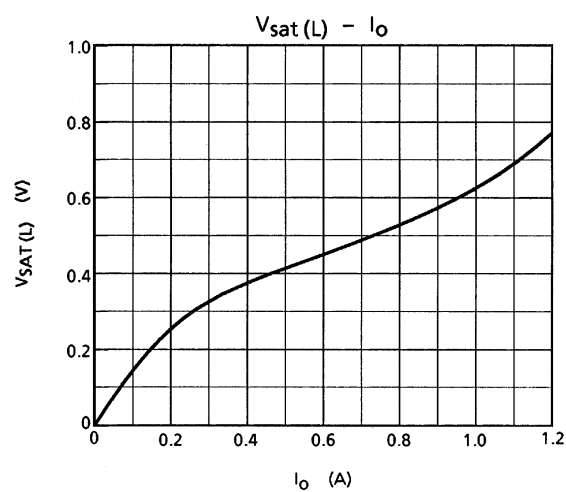
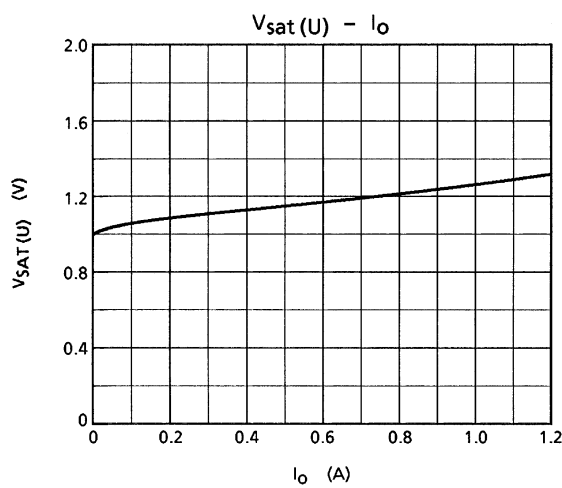
Note 2: 50 × 50 × 1mm Fe board, Mounting

Note 3: T_c = 75°C

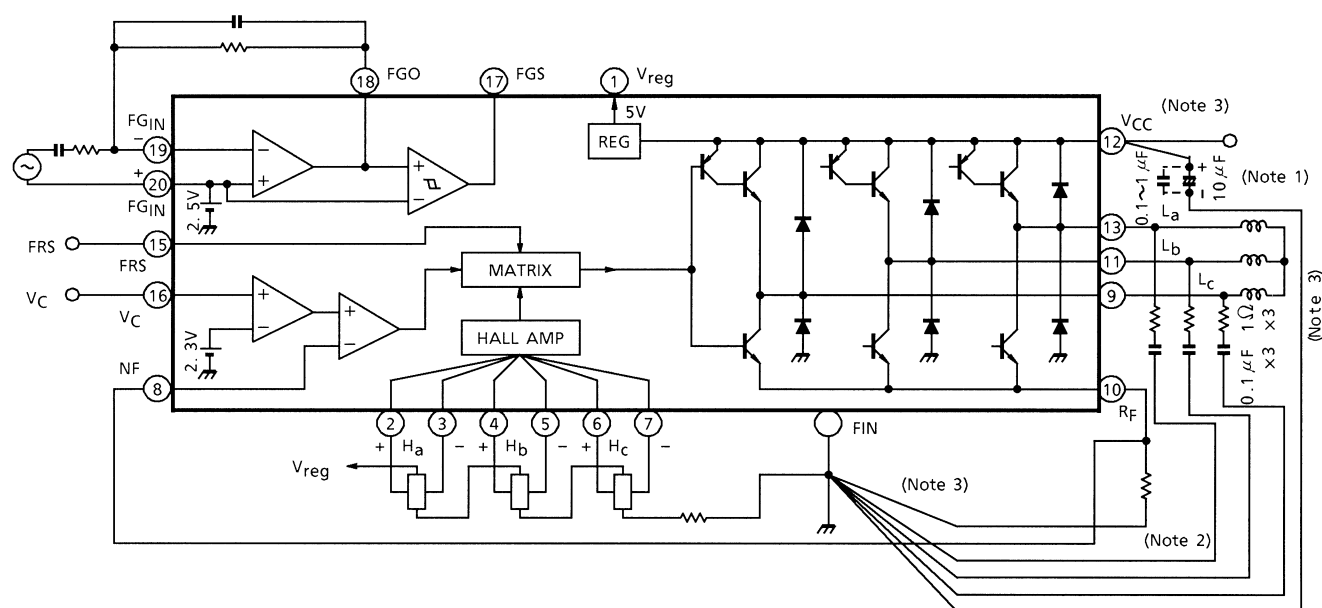
ELECTRICAL CHARACTERISTICS (V_{CC} = 12 V, Ta = 25°C)

CHARACTERISTIC		SYMBOL	TEST CIR-CUIT	TEST CONDITION	MIN	TYP.	MAX	UNIT
Supply Current		I _{CC1}	—	Output open, FRS = 2.5 V	—	12.5	25	mA
		I _{CC2}	—	Output open, FRS = GND	—	14	25	
		I _{CC3}	—	Output open, FRS = 5 V	—	14	25	
Rotation Control Circuit	Control Gain (V _C → Out)	G _{VCO}	—	V _{CC} = 12 V, V _H = 50 mV _{p-p}	7.5	13	18	dB
	Input Current (V _C)	I _{CIN}	—	V _C = GND (Sink current)	—	0.2	5	μA
	Internal Reference-1	V _{ref 1}	—	—	2.15	2.30	2.45	V
Position Sensing Circuit	Common Mode Range	CMR _H	—	—	1.5	—	5	V
	Input Current	I _H	—	V _{IH} = 2.5 V	—	0.2	3	μA
	Voltage Gain (Each Hall Input to OUT)	G _{VHO}	—	V _C = 5 V, V _{CC} = 12 V	40	47	51	dB
Output Driver	Upper Side Saturation	V _{sat (U)}	—	I _O = 1.0 A	—	1.2	1.9	V
	Lower Side Saturation	V _{sat (L)}	—	I _O = 1.0 A	—	0.7	1.5	
	Quiescent Voltage	V _{OS}	—	V _C = 1.0 V	5.0	5.5	7.0	V
	Quiescent Voltage Difference	V _{OOF}	—	Each output to output	—	25	50	mV
FG Amp	Open Loop Gain	G _{VFG}	—	f _{FG} = 1 kHz	—	70	—	dB
	Band Width	f _{FG}	—	—	DC	—	50	kHz
	Output Voltage Swing	V _{FGO}	—	I _{FGO} = 5 mA	1.0	2.1	4	V
	FGS Saturation	V _{sat (FGS)}	—	I _{FGS} = 4 mA	—	0.15	0.25	V
	Internal Reference-2	V _{ref 2}	—	—	2.1	2.5	2.9	V
	Hysteresis Voltage	V _{HYS}	—	—	—	100	250	mV
Rotation Direction Control	FWD	Operating Voltage	V _{FWD}	—	4.0	—	V _{CC}	V
	STOP	Operating Voltage	V _{STOP}	—	1.9	—	3.1	V
	REVERSE	Operating Voltage	V _{REV}	—	0	—	1.3	V
Regulator Output Voltage		V _{REG}	—	I _H = 10 mA	4.7	5.1	5.5	V
Thermal Shutdown Operating Temperature		T _{SD}	—	—	150	—	—	°C

Output Amplifier Saturation Voltage Characteristics



APPLICATION CIRCUIT



Note 1: Connect if required (0.1~1 μ F)

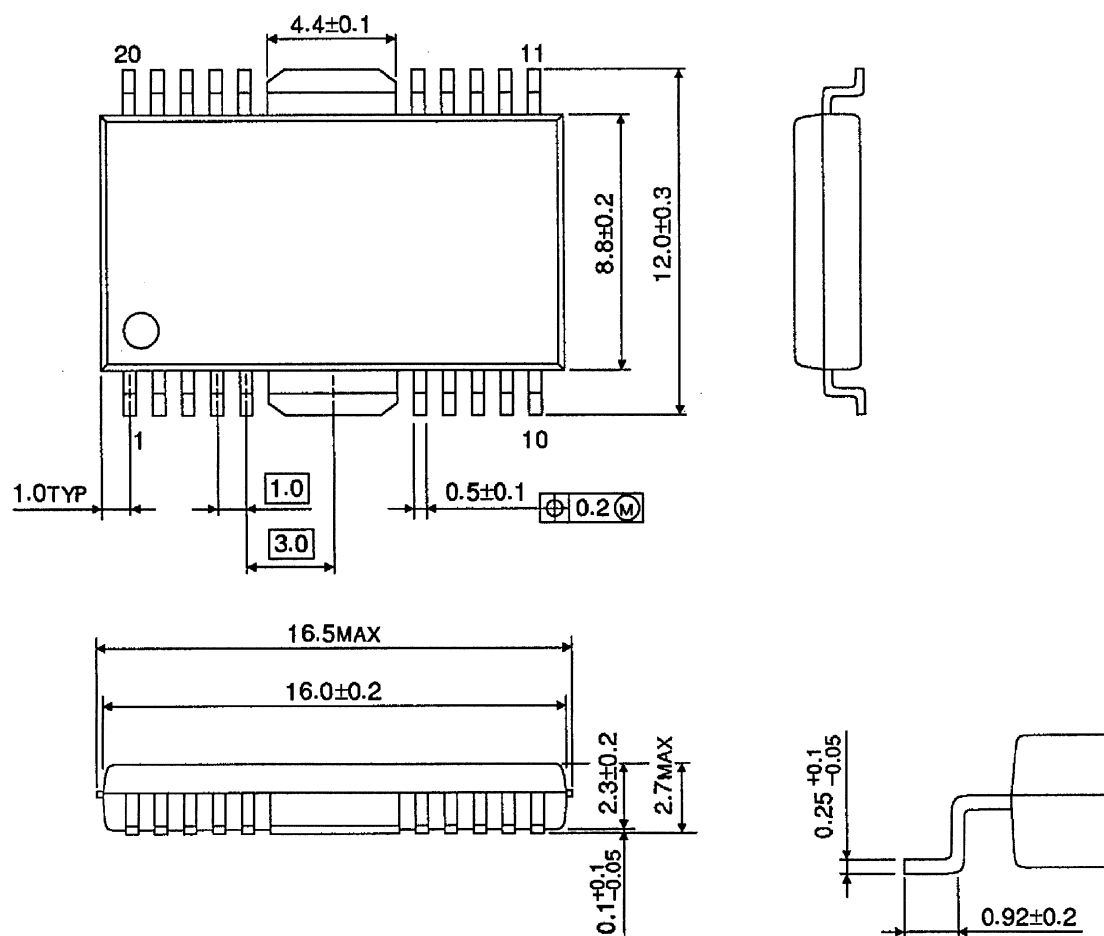
Note 2: Care should be taken not to have common impedance between R_F GND Line and other small signal lines for stable operations (especially for Hall Sensor GND line).

Note 3: Utmost care is necessary in the design of the output line, V_{CC} and GND line since IC may be destroyed due to short-circuit between outputs, air contamination fault, or fault by improper grounding.

PACKAGE DIMENSIONS

HSOP20-P-450-1.00

Unit : mm



Weight : 0.79 g (Typ.)

RESTRICTIONS ON PRODUCT USE

000707EBA

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