M51724P,FP

3-PHASE BRUSHLESS MOTOR PRE-DRIVER

DESCRIPTION

The M51724P,FP are semiconductor integrated circuits designed for use in 3-phase DC brushless motor.

FEATURES

- Suitable for various kind of motor system by selecting the external power transistors
- Internal current distribution circuit
- Good balance in output current between each phase
- Few externally connected parts

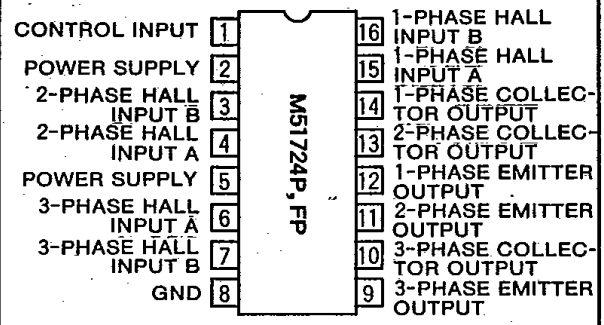
APPLICATION

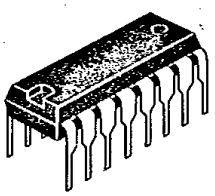
Brushless motor driver for VTR, cassette tape deck, floppy-disk drive.

RECOMMENDED OPERATING CONDITIONS

Supply voltage range ..... 10V~20V
Rated supply voltage 15V

PIN CONFIGURATION (TOP VIEW)

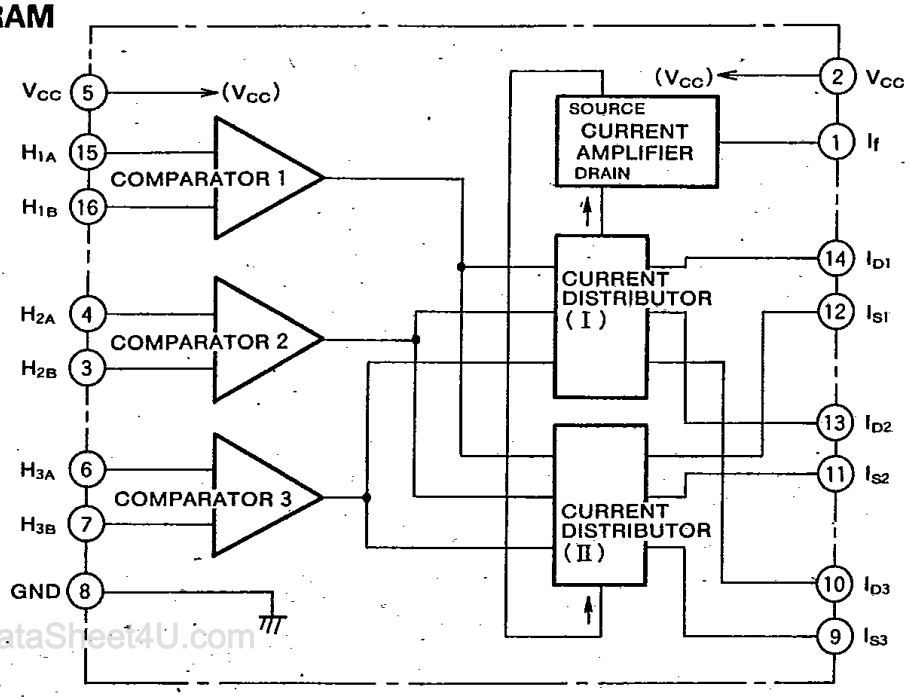




16-pin molded plastic DIP

16-pin molded plastic FLAT

BLOCK DIAGRAM



MITSUBISHI ELECTRIC

ABSOLUTE MAXIMUM RATINGS (T_a=25℃, unless otherwise noted)

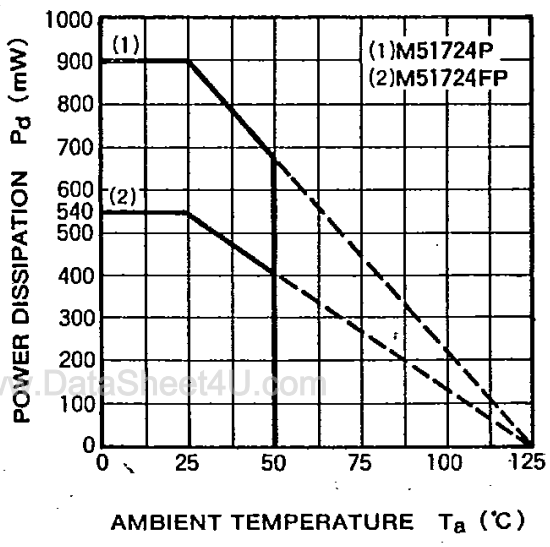
Symbol	Parameter	Conditions	Ratings	Unit
V_{CC}	Supply voltage		20	V
I_f	Control input current		1	mA
V_D	Applied voltage at collector output pin		24	V
V_S	Applied voltage at emitter output pin		6.5	V
V_H	Applied voltage at hall output pins		6.5	V
f_{in}	Hall input frequency		DC~1	kHz
P_d	Power dissipation	( )=M51724FP	900(540)	mW
$K\theta$	Thermal derating(T≧25℃)	( )=M51724FP	110(185)	℃/W
T_{opr}	Operating temperature		−10~+50	℃
T_{stg}	Storage temperature		−40~+125	℃

ELECTRICAL CHARACTERISTICS (T_a=25℃, V_{CC}=15V, unless otherwise noted)

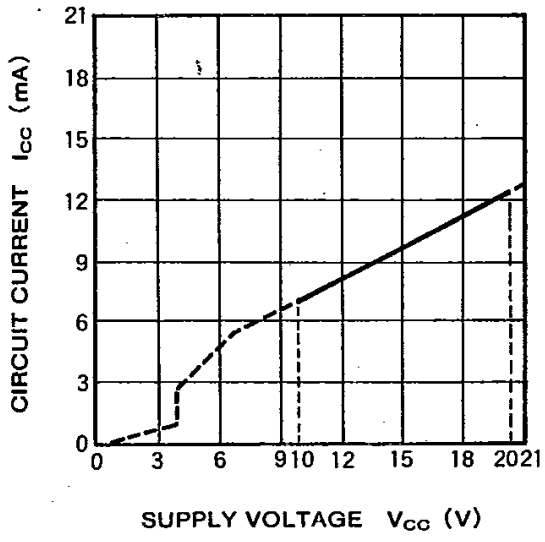
Symbol	Parameter	Test conditions	Limits			Unit
			Min	Typ	Max	
I_{CC}	Circuit current		5	12	27	mA
V_{offset}	Comparator input offset voltage			5	20	mV
K_D	Collector output current gain		10	15	20	A/A
K_S	Emitter output current gain		11	16	21	A/A
$I_{D(max1)}$	Maximum output current of collector output (1)		3	4		mA
$I_{D(max2)}$	Maximum output current of collector output (2)		5.5	7		mA
$I_{S(max1)}$	Maximum output current of emitter output (1)		3	4		mA
$I_{S(max2)}$	Maximum output current of emitter output (2)		5	7		mA
M_D	Current gain ratio between collector output phases		0.75	1	1.33	A/A
M_S	Current gain ratio between emitter output phases		0.75	1	1.33	A/A
I_{in}	Comparator input current		0.1	1.5	6	μA
I_{LD}	Collector output leak current				200	nA
I_{LS}	Emitter output leak current				200	nA

TYPICAL CHARACTERISTICS (T_a=25℃, unless otherwise noted)

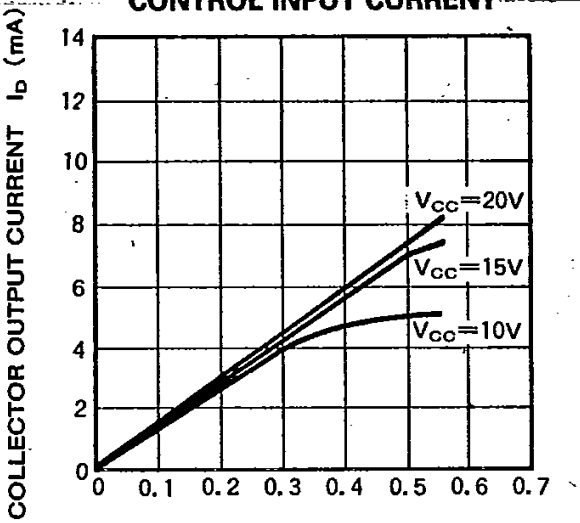
THERMAL DERATING (MAXIMUM RATING)



CIRCUIT CURRENT VS. SUPPLY VOLTAGE

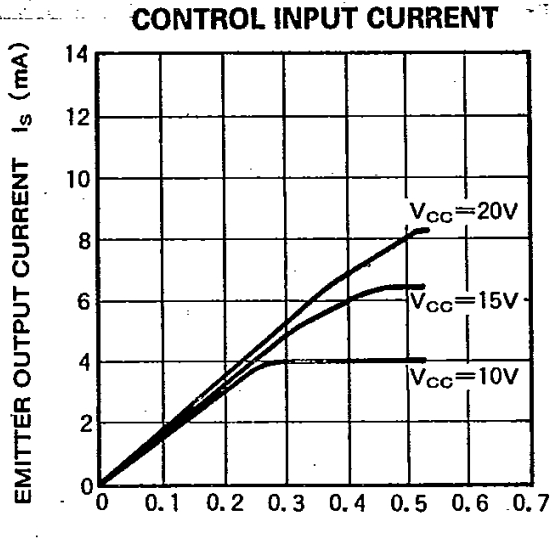


COLLECTOR OUTPUT CURRENT VS. CONTROL INPUT CURRENT



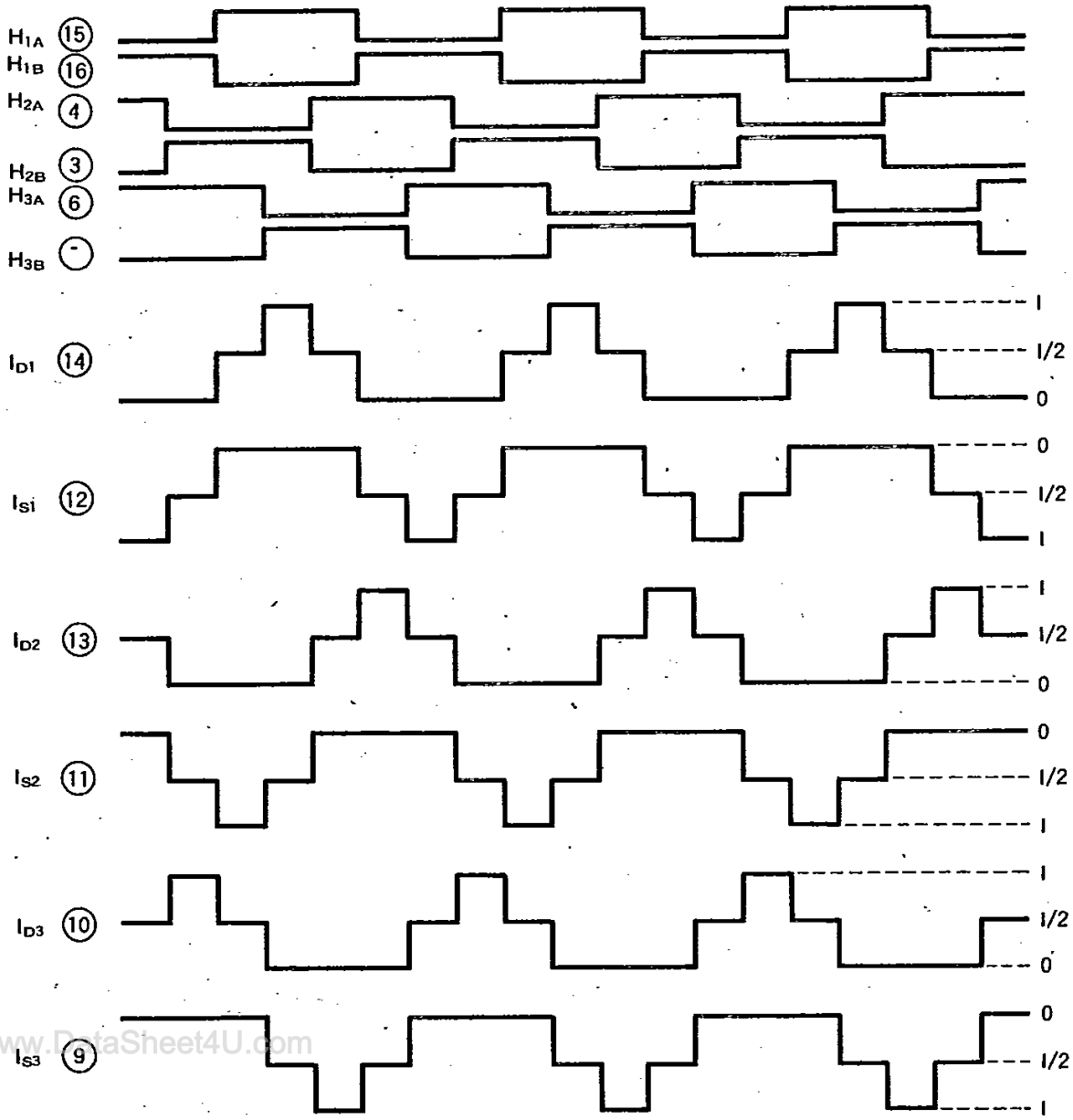
Note. when collector output 1 system and emitter output 2 system are ON

EMITTER OUTPUT CURRENT VS. CONTROL INPUT CURRENT



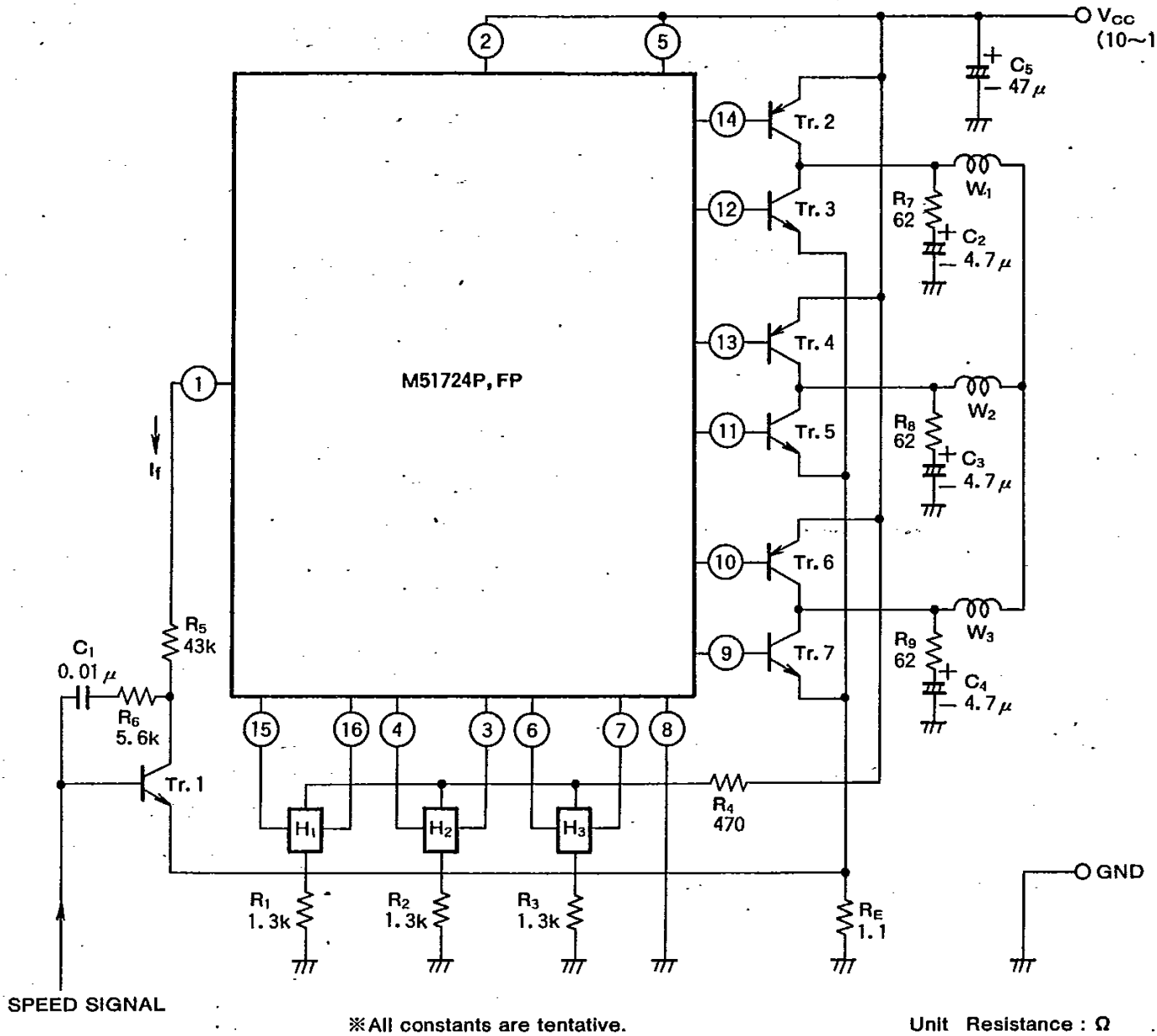
Note. when collector output 2 system and emitter output 1 system are ON

INPUT/OUTPUT TIMING CHART OF THE M51724P,FP



Note : 1. In the output current value (I_D, I_S) , + indicates source current and — indicates sink current.
2. All the input pins are biased.
3. Care must be taken to connect a load (low impedance) to all the output pins according to the current at the control input Pin ①.

APPLICATION EXAMPLE



※All constants are tentative.

Unit Resistance : Ω
Capacitance : F

NOTE :

1. R_1~R_4 : For hall element bias
2. R_5 : For output (input) current limiting
3. R_6, C_1 : For oscillation prevention
4. R_7-R_9, C_2, C_4 : For reduction of driver noise
5. C_5 : For power supply stabilizing
6. R_E : For current feedback
7. Tr. 1 : Control transistor (S. S.)
8. Tr. 2-Rr. 7 : Power transistors
9. H_1-H_3 : Hall elements for position detection
10. The same power supply (V_{CC}) must be connected to Pin ② and Pin ⑤.