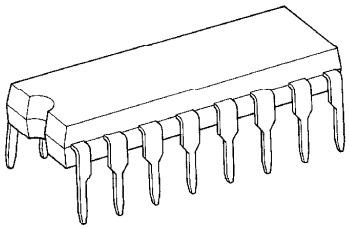
TOSHIBA Bi-CMOS INTEGRATED CIRCUIT SILICON MONOLITHIC

TB6515AP

SENSORLESS MOTOR DRIVER IC

The TB6515AP is a sensorless motor driver IC developed mainly for use with VTR cylinder motors. The PG and FG sensors are sensorless three-phase brushless motor driver ICs with sharing capabilities (specific magnetism is required).



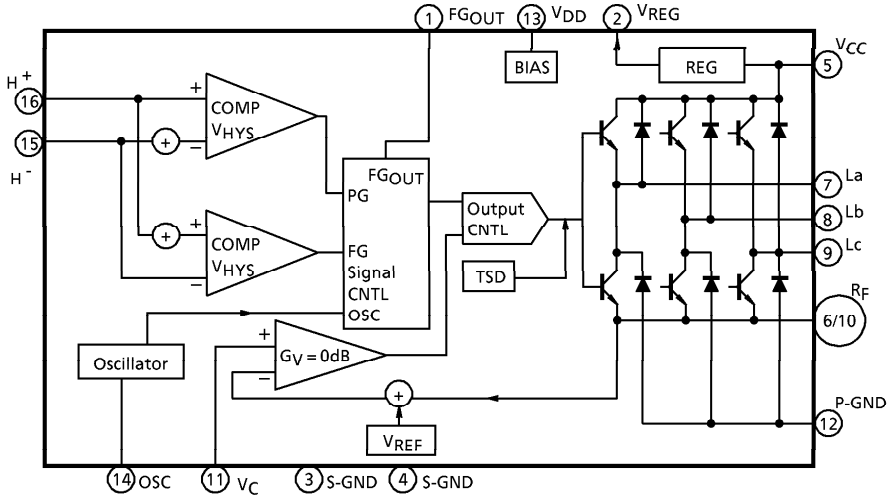
DIP16-P-300-2.54A

Weight : 1.11g (Typ.)

FEATURES

- The PG and FG sensors can be shared, and the motor driver areas are sensorless.
- Three-phase full-wave drive models.
- Equipped with FG output.
- Built-in thermal shut-down circuits.
- Built-in power source for the PG and FG sensors.

BLOCK DIAGRAM



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PIN FUNCTION

PIN No.	PIN SYMBOL	PIN FUNCTION
1	FG_{OUT}	FG signal output pin
2	V_{REG}	Internal power source voltage output pin
3	S-GND	Small signal ground pin
4	S-GND	Small signal ground pin
5	V_{CC}	Power source applied voltage pin
6	R_F	Output current detection pin
7	La	a-phase drive output pin
8	Lb	b-phase drive output pin
9	Lc	c-phase drive output pin
10	R_F	Output current detection pin
11	V_C	Control amplifier positive input pin
12	P-GND	Output ground pin
13	V_{DD}	Internal power source voltage output pin
14	OSC	Oscillation condenser connection pin
15	H^-	PG / FG comparator negative input pin
16	H^+	PG / FG comparator positive input pin

MAXIMUM RATINGS (Ta = 25°C)

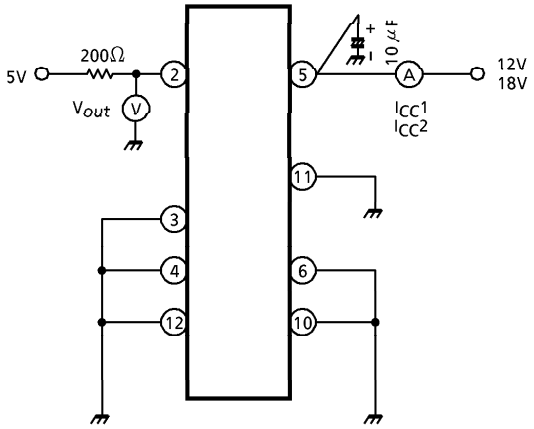
CHARACTERISTIC	SYMBOL	RATING	UNIT
Power Suplly Voltage	V_{CC}	18	V
Output Current	I_O	1.0	A
Regulator Output Current	I_{REG}	12	mA
FG Output Current	I_{FG}	2.0	mA
Power Dissipation	P_D	(Note) 1.2	W
Operating Temperature	T_{opr}	− 30 ~ 85	°C
Storage Temperature	T_{stg}	− 55 ~ 150	°C

(Note) IC units

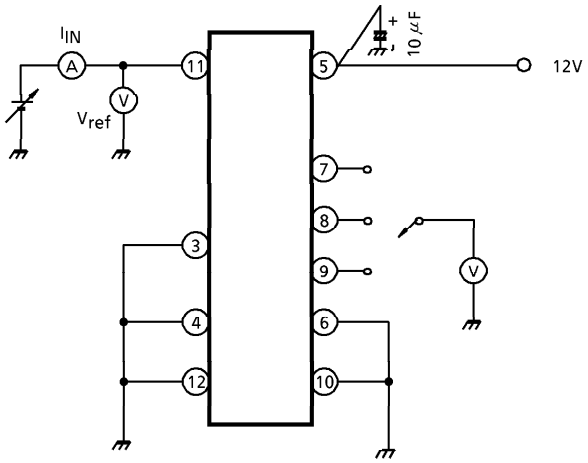
ELECTRICAL CHARACTERISTICS (V_{CC} = 12V, Ta = 25°C)

CHARACTERISTIC		SYMBOL	TEST CIR-CUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Power Suplly Current		I_{CC1}	1	V_{CC} = 12V, V_C = 0V, V_{REG} = OPEN	—	9.0	15	mA
		I_{CC2}	1	V_{CC} = 18V, V_C = 0V, V_{REG} = OPEN	—	9.3	15	
Control Amplifier	Standard Voltage	V_{ref}	2		—	2.6	—	V
	Voltage Gain	G_V	6		—	1.0	—	
	Input Current	I_{IN}	2	V_C = 3.5V	—	2.5	10	μA
Leak Current	Upper	$I_{OL\ (U)}$	—	V_{CC} = 18V, V_C = 0V	—	—	50	μA
	Lower	$I_{OL\ (L)}$		V_{CC} = 18V, V_C = 0V	—	—	50	
Output Saturation Voltage	Upper	$V_{sat\ (U)}$	3	I_O = 1A	—	1.5	1.9	V
	Lower	$V_{sat\ (L)}$		I_O = 1A	—	0.8	1.2	
Correlated Gain Difference		ΔG_V	—		—	—		%
Residual Output Voltage		V_{or}	6	V_C = 0V	—	0	10	mV
FG / PG Threshold Level	FG Upper Level	V_{FGH}	5	L → H	91	104	117	mV
	FG Lower Level	V_{FGL}		H → L	108	121	134	
	PG Upper Level	V_{PGH}		L → H	118	131	144	
	PG Lower Level	V_{PGL}		H → L	139	152	165	
Hall Amp Common-Mode Input Voltage		CMR	—			—	2.0	V
FG Output Voltage		$V_{FG\ (L)}$	4	I_{FG} = 1mA	—	—	1.1	V
FG Output Current		I_{FG}	—		1.8	2.0	—	mA
Delta-Wave Oscillation Frequency		f_{OSC}	7	C_{OSC} = 0.1μF	—	8	—	Hz
Rated Voltage Output Circuit	Output Voltage	V_{REG}		RL = 200Ω : 5V	1.35	1.45	1.55	V
	Temperature Variable	ΔV_O	1	RL = 200Ω, T_j = − 20~70°C	—	±30	—	mV
	Output Current	I_{REG}	—		20	—	—	mA
Thermal Shut-Off Circuit Operating Temperature		T_{SD}	—		150	—	—	°C

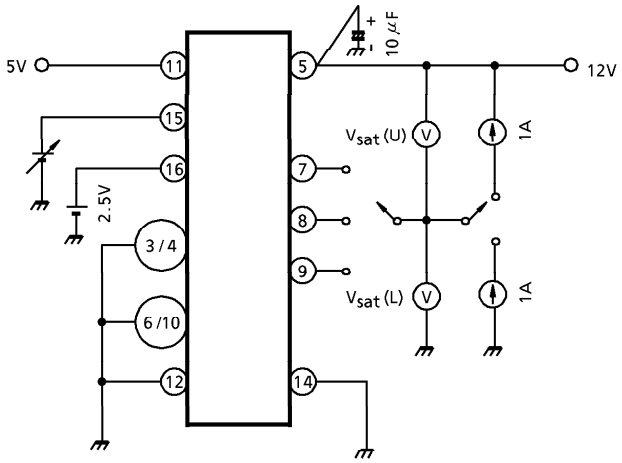
TEST CIRCUIT 1.



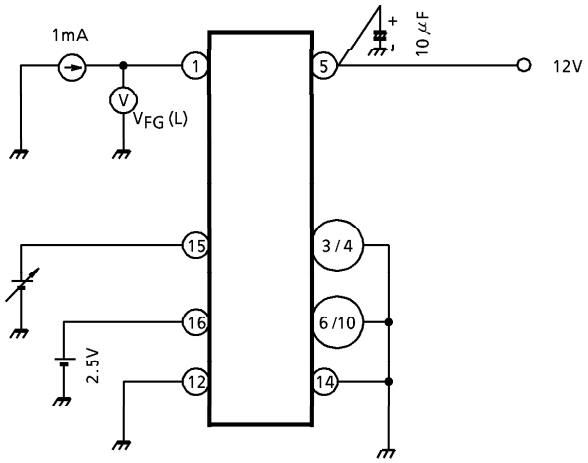
TEST CIRCUIT 2.



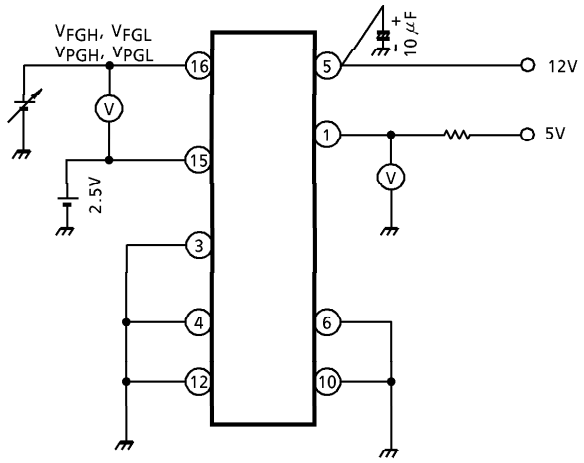
TEST CIRCUIT 3.



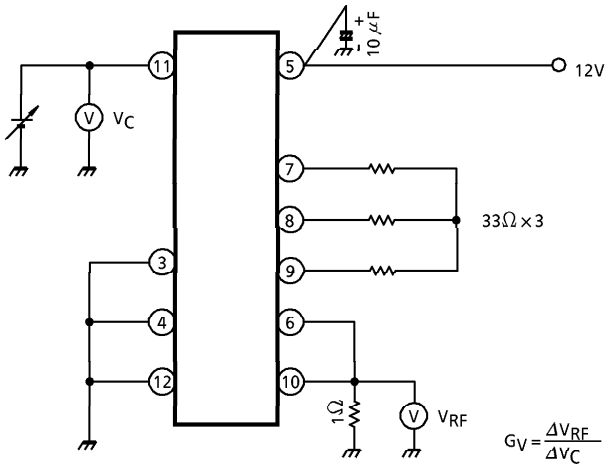
TEST CIRCUIT 4.



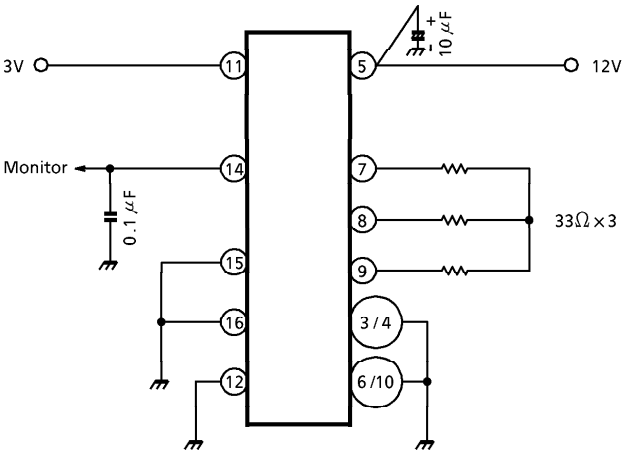
TEST CIRCUIT 5.

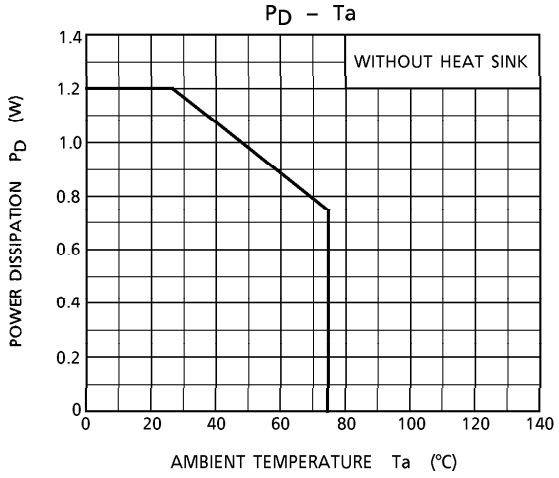


TEST CIRCUIT 6.

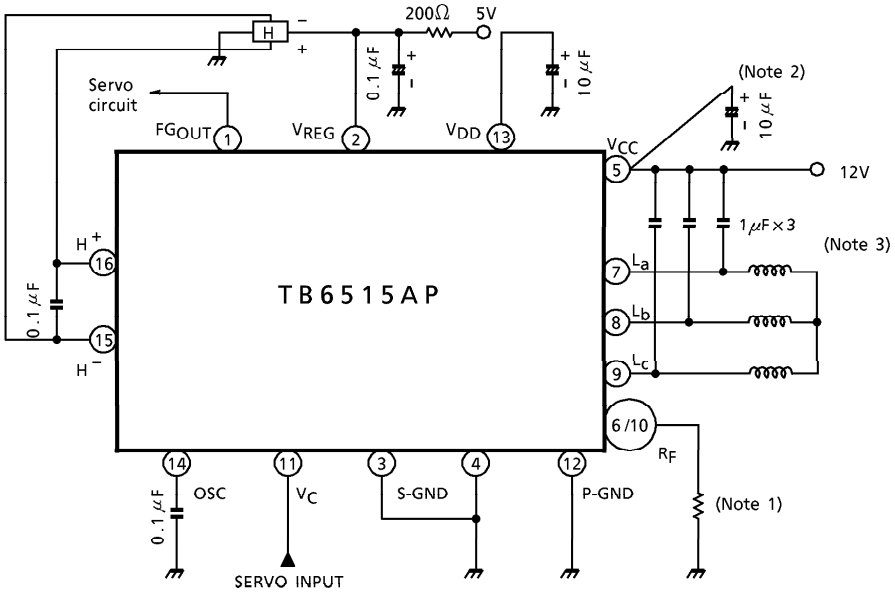


TEST CIRCUIT 7.





APPLICATION CIRCUIT



(Note 1) R_F is determined in accordance with coil impedance, F / V conversion voltage (control input), the required torque and other factors, but between approximately 0.3 and 5Ω should be used.

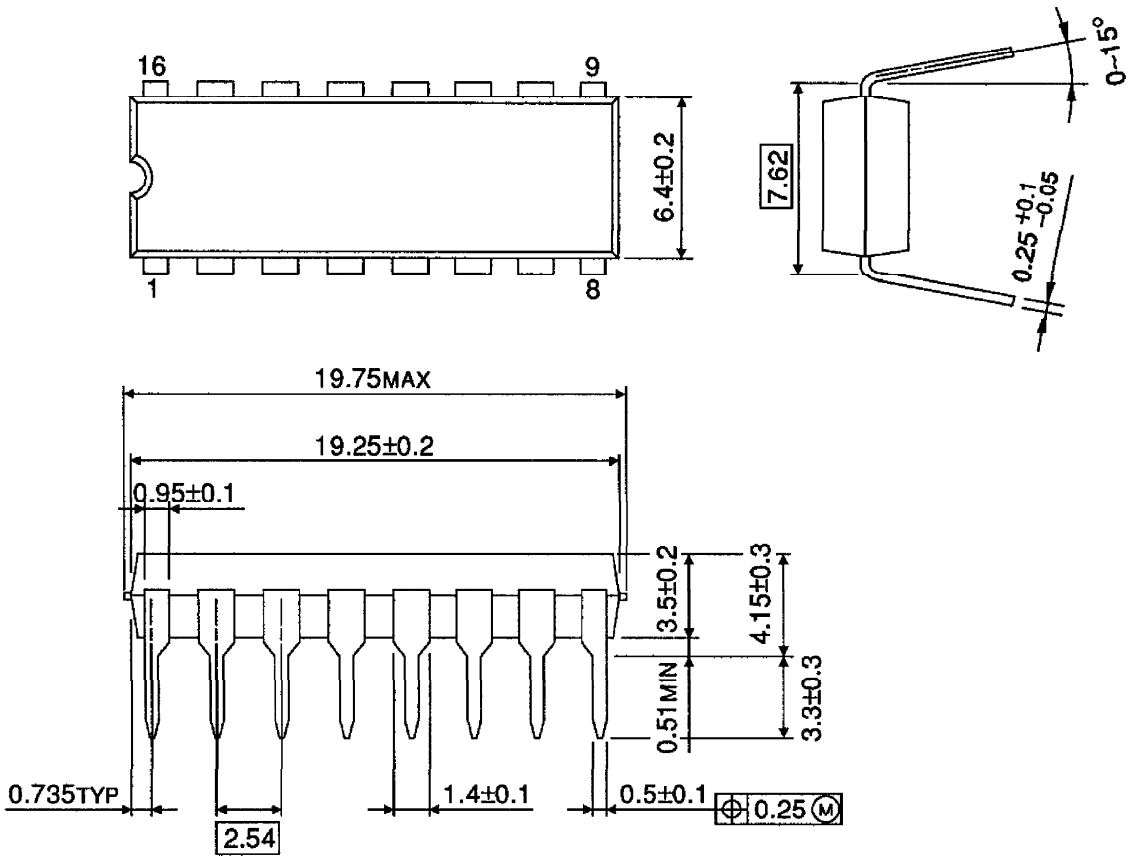
(Note 2) It is recommended that the IC pin and GND are connected directly. Ever larger levels of capacity may be required depending on the shared impedance of the power source line.

(Note 3) There may be cases where connections (various output → GND, etc.) and capacity needs to be amended in order to prevent noise and vibrations from the motor.

OUTLINE DRAWING

DIP16-P-300-2.54A

Unit : mm



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