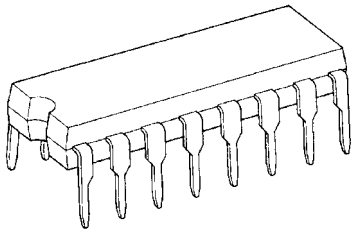
TOSHIBA Bi−CMOS INTEGRATED CIRCUIT SILICON MONOLITHIC

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).



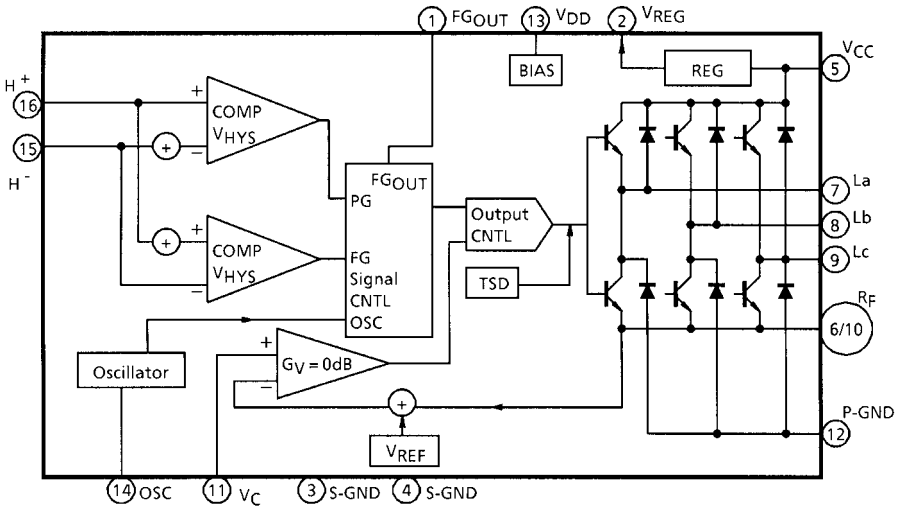
DIP16-P-300-2.54A

Weight: 1.11 g (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



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)

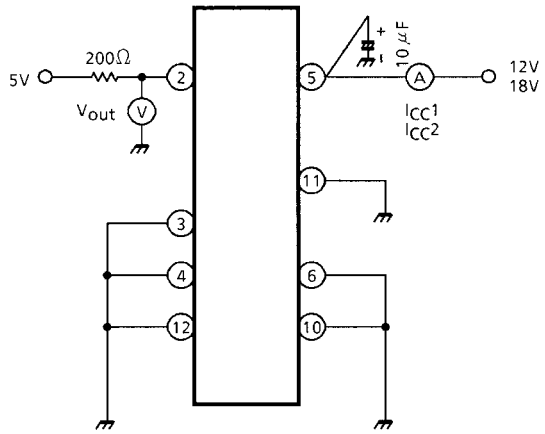
CHARACTERISTIC	SYMBOL	RATING	UNIT
Power Suplly Voltage	V_{CC}	18	V
Output Current	I_O	1.0	A
Regulator Output Current	I_{REG}	12	mA
FG Output Current	I_{FG}	2.0	mA
Power Dissipation	P_D	1.2 (Note)	W
Operating Temperature	T_{opr}	−30 ~ 85	°C
Storage Temperature	T_{stg}	−55 ~ 150	°C

Note: IC units

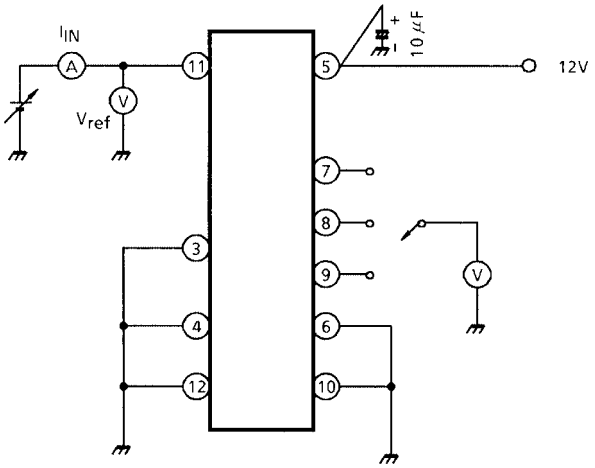
ELECTRICAL CHARACTERISTICS (V_{CC} = 12 V, Ta = 25°C)

CHARACTERISTIC		SYMBOL	TEST CIR-CUIT	TEST CONDITION	MIN	TYP.	MAX	UNIT
Power Suplly Current		I_{CC1}	1	V_{CC} = 12 V, V_C = 0 V, V_{REG} = OPEN	—	9.0	15	mA
		I_{CC2}	1	V_{CC} = 18 V, V_C = 0 V, 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 = 3.5 V	—	2.5	10	μA
Leak Current	Upper	$I_{OL\ (U)}$	—	V_{CC} = 18 V, V_C = 0 V	—	—	50	μA
	Lower	$I_{OL\ (L)}$		V_{CC} = 18 V, V_C = 0 V	—	—	50	
Output Saturation Voltage	Upper	$V_{sat\ (U)}$	3	I_O = 1 A	—	1.5	1.9	V
	Lower	$V_{sat\ (L)}$		I_O = 1 A	—	0.8	1.2	
Correlated Gain Difference		ΔG_V	—		—	—		%
Residual Output Voltage		V_{or}	6	V_C = 0 V	—	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	
	FG Upper Level	V_{PGH}		L → H	118	131	144	
	FG Lower Level	V_{PGL}		H → L	139	152	165	
Hall Amp Common-Mode Input Voltage		CMR	—		0.11	—	2.0	V
FG Output Voltage		$V_{FG\ (L)}$	4	I_{FG} = 1 mA	—	—	1.1	V
FG Output Current		I_{FG}	—		1.8	2.0	—	mA
Delta-Wave Oscillation Frequency		f_{OSC}	7	C_{OSC} = 0.1 μF	—	8	—	Hz
Rated Voltage Output Circuit	Output Voltage	V_{REG}		RL = 200 Ω : 5 V	1.35	1.45	1.55	V
	Temperature Variable	ΔV_O	1	RL = 200 Ω, T_j = −20~70°C	—	±30	—	mV
	Output Current	I_{REG}	—		20	—	—	mA
Thermal Shut-Off Circuit Operating Temperature		T_{SD}	—		150	—	—	°C

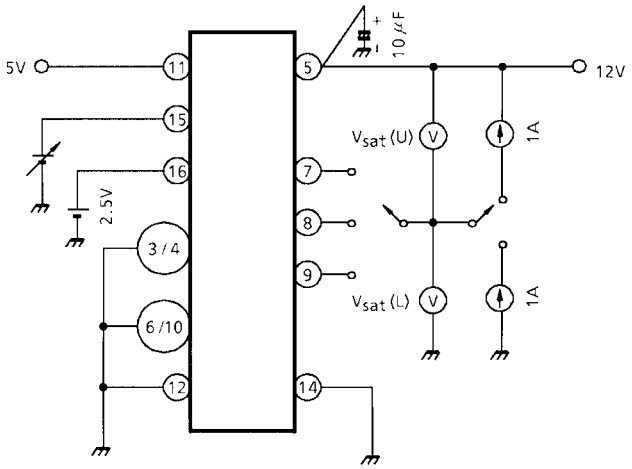
TEST CIRCUIT 1.



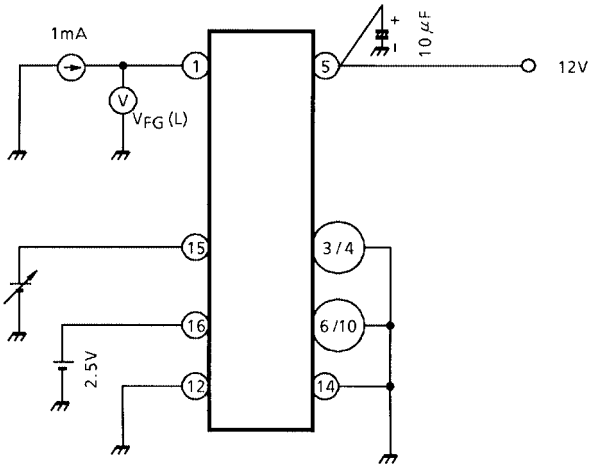
TEST CIRCUIT 2.



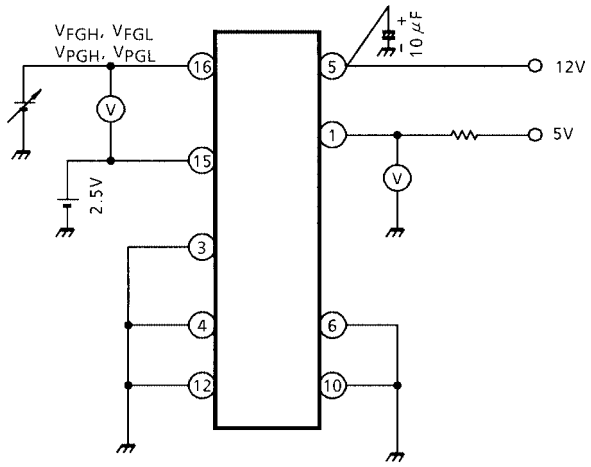
TEST CIRCUIT 3.



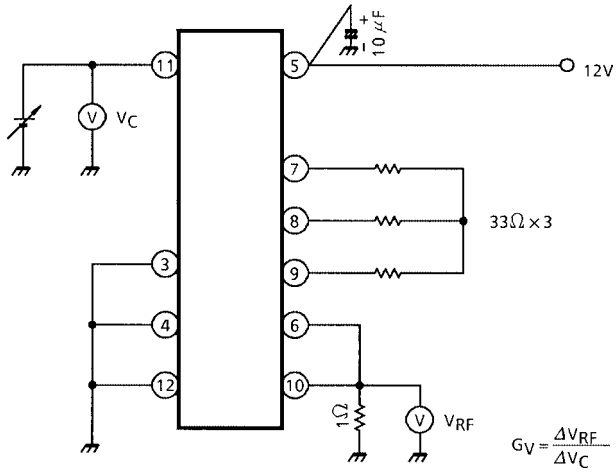
TEST CIRCUIT 4.



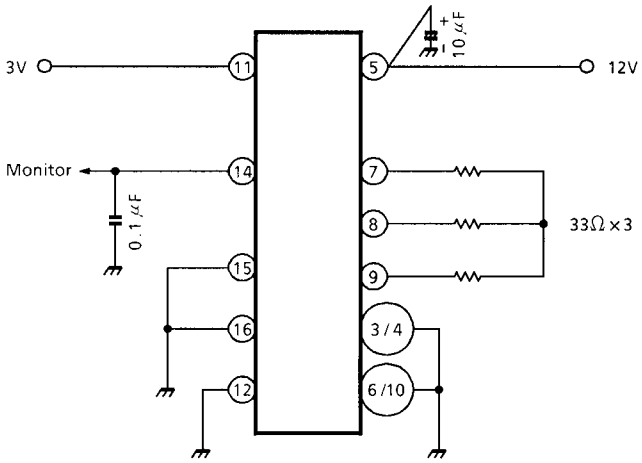
TEST CIRCUIT 5.

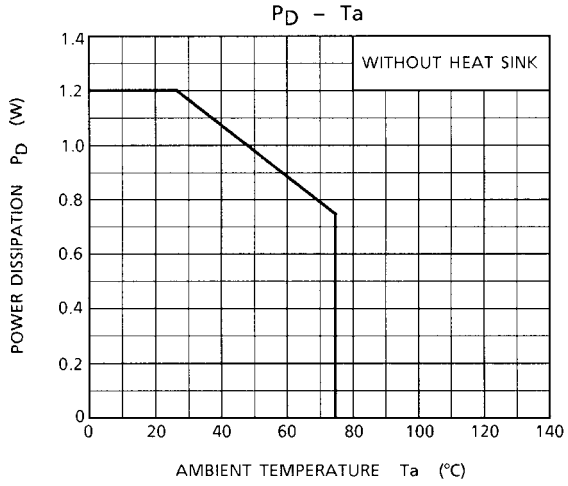


TEST CIRCUIT 6.

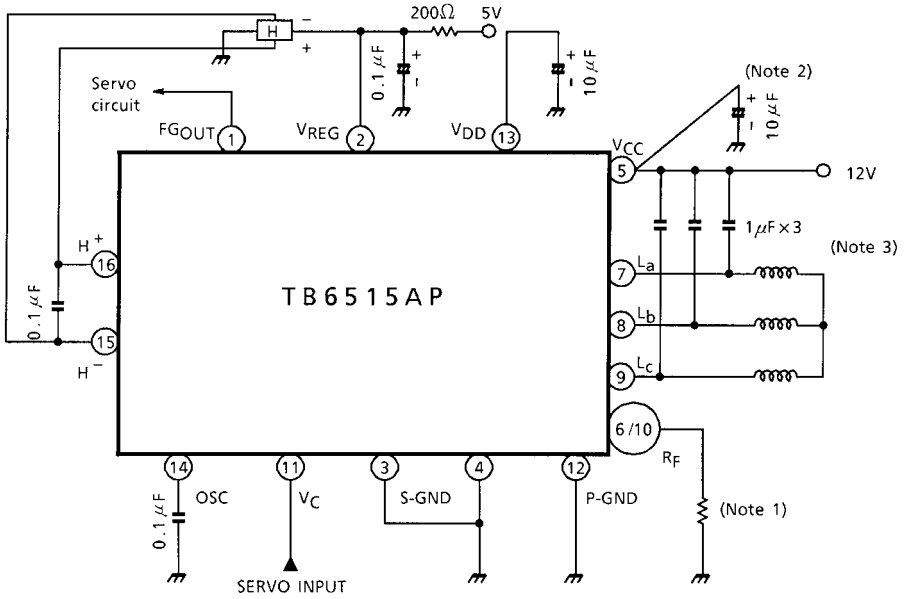


TEST CIRCUIT 7.





APPLICATION CIRCUIT



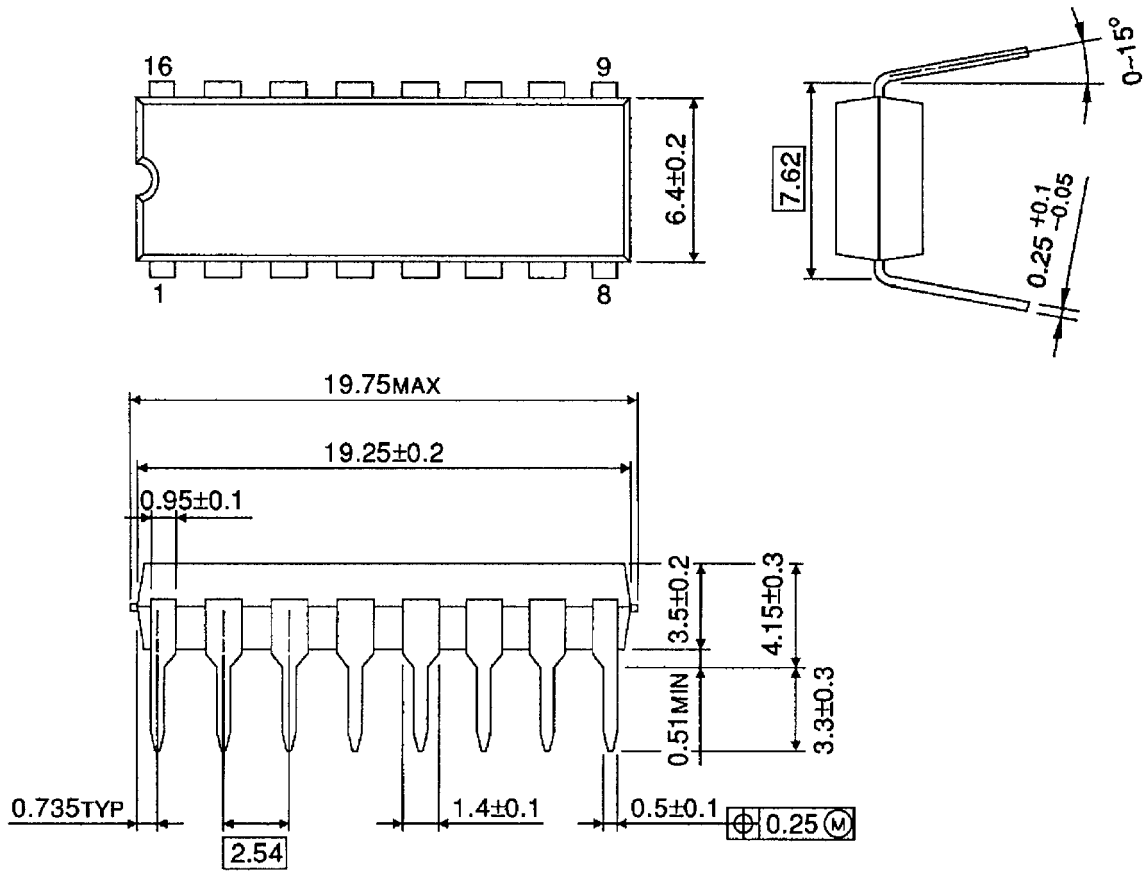
Note 1: R_F is determined in accordance with coil impedance, F / V conversion voltage (control input), the required torque and other factors, but between approximately 0.3 and 5 Ω should be used.

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.

PACKAGE DIMENSIONS

DIP16−P−300−2.54A Unit: mm



Weight: 1.11 g (Typ.)

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