

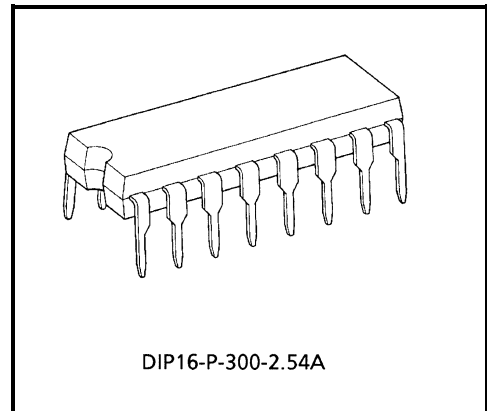
# TB6515AP

## 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).

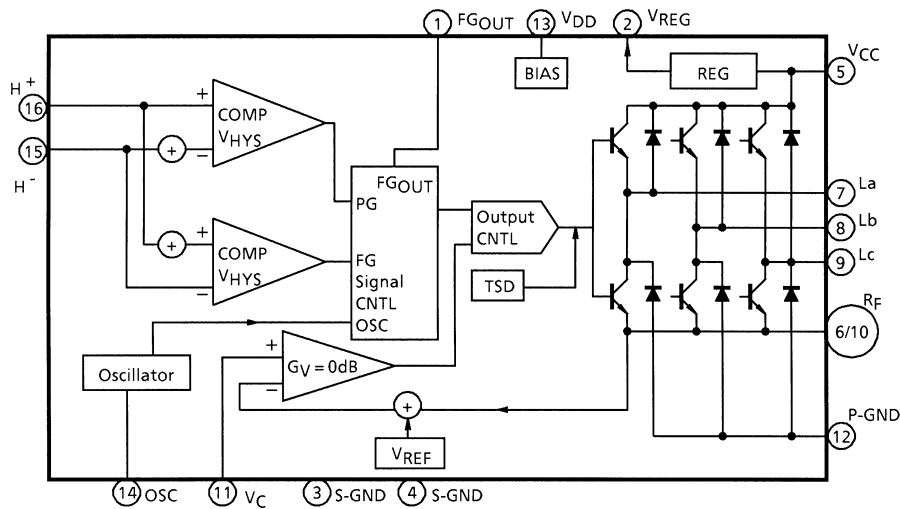
### FEATURES

- 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.



Weight: 1.11 g (Typ.)

### BLOCK DIAGRAM



## PIN FUNCTION

PIN No.	PIN SYMBOL	PIN FUNCTION
1	FG <sub>OUT</sub>	FG signal output pin
2	V <sub>REG</sub>	Internal power source voltage output pin
3	S-GND	Small signal ground pin
4	S-GND	Small signal ground pin
5	V <sub>CC</sub>	Power source applied voltage pin
6	R <sub>F</sub>	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 <sub>F</sub>	Output current detection pin
11	V <sub>C</sub>	Control amplifier positive input pin
12	P-GND	Output ground pin
13	V <sub>DD</sub>	Internal power source voltage output pin
14	OSC	Oscillation condenser connection pin
15	H <sup>-</sup>	PG / FG comparator negative input pin
16	H <sup>+</sup>	PG / FG comparator positive input pin

## MAXIMUM RATINGS (Ta = 25°C)

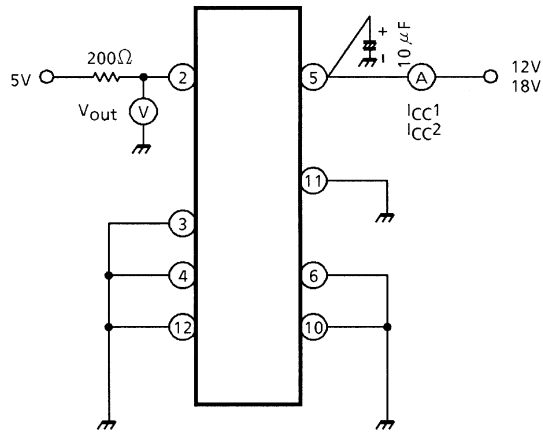
CHARACTERISTIC	SYMBOL	RATING	UNIT
Power Supply Voltage	V <sub>CC</sub>	18	V
Output Current	I <sub>O</sub>	1.0	A
Regulator Output Current	I <sub>REG</sub>	12	mA
FG Output Current	I <sub>FG</sub>	2.0	mA
Power Dissipation	P <sub>D</sub>	1.2 (Note)	W
Operating Temperature	T <sub>opr</sub>	-30 ~ 85	°C
Storage Temperature	T <sub>stg</sub>	-55 ~ 150	°C

Note: IC units

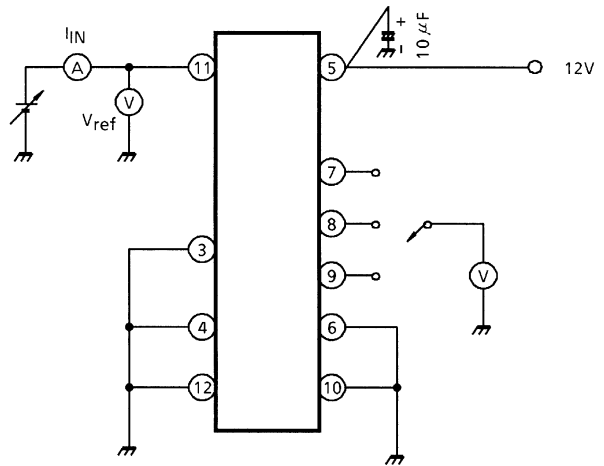
## ELECTRICAL CHARACTERISTICS ( $V_{CC} = 12\text{ V}$ , $T_a = 25^\circ\text{C}$ )

CHARACTERISTIC		SYMBOL	TEST CIR-CUIT	TEST CONDITION	MIN	TYP.	MAX	UNIT
Power Supply Current		$I_{CC1}$	1	$V_{CC} = 12\text{ V}$ , $V_C = 0\text{ V}$ , $V_{REG} = \text{OPEN}$	—	9.0	15	mA
		$I_{CC2}$	1	$V_{CC} = 18\text{ V}$ , $V_C = 0\text{ V}$ , $V_{REG} = \text{OPEN}$	—	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	$V_C = 3.5\text{ V}$	—	2.5	10	
Leak Current	Upper	$I_{OL(U)}$	—	$V_{CC} = 18\text{ V}$ , $V_C = 0\text{ V}$	—	—	50	$\mu\text{A}$
	Lower	$I_{OL(L)}$		$V_{CC} = 18\text{ V}$ , $V_C = 0\text{ V}$	—	—	50	
Output Saturation Voltage	Upper	$V_{sat(U)}$	3	$I_O = 1\text{ A}$	—	1.5	1.9	V
	Lower	$V_{sat(L)}$		$I_O = 1\text{ A}$	—	0.8	1.2	
Correlated Gain Difference		$\Delta G_V$	—		—	—		%
Residual Output Voltage		$V_{or}$	6	$V_C = 0\text{ V}$	—	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	
	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	—		0.11	—	2.0	V
FG Output Voltage		$V_{FG(L)}$	4	$I_{FG} = 1\text{ mA}$	—	—	1.1	V
FG Output Current		$I_{FG}$	—		1.8	2.0	—	mA
Delta-Wave Oscillation Frequency		$f_{OSC}$	7	$C_{OSC} = 0.1\ \mu\text{F}$	—	8	—	Hz
Rated Voltage Output Circuit	Output Voltage	$V_{REG}$	—	$R_L = 200\ \Omega : 5\text{ V}$	1.35	1.45	1.55	V
	Temperature Variable	$\Delta V_O$	1	$R_L = 200\ \Omega$ , $T_j = -20 \sim 70^\circ\text{C}$	—	$\pm 30$	—	mV
	Output Current	$I_{REG}$	—		20	—	—	mA
Thermal Shut-Off Circuit Operating Temperature		$T_{SD}$	—		150	—	—	$^\circ\text{C}$

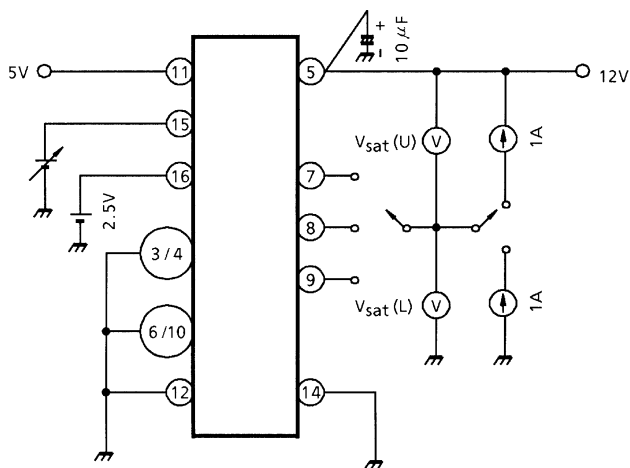
### TEST CIRCUIT 1.



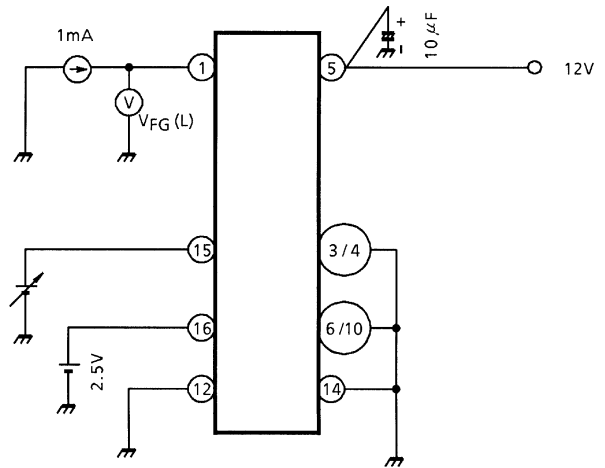
### TEST CIRCUIT 2.



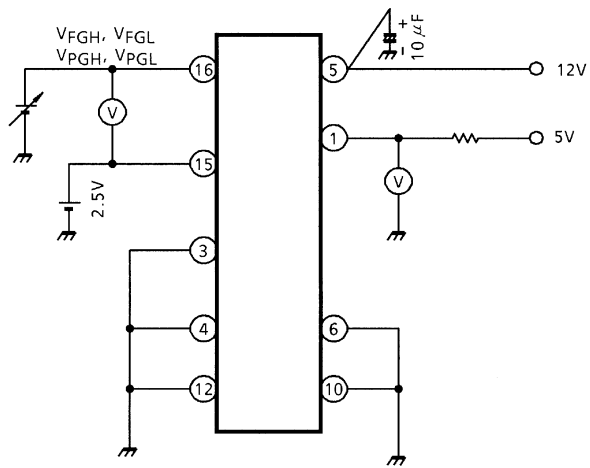
### TEST CIRCUIT 3.



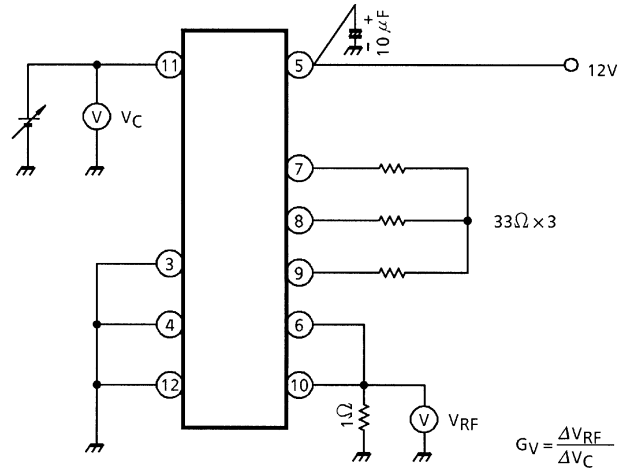
### TEST CIRCUIT 4.



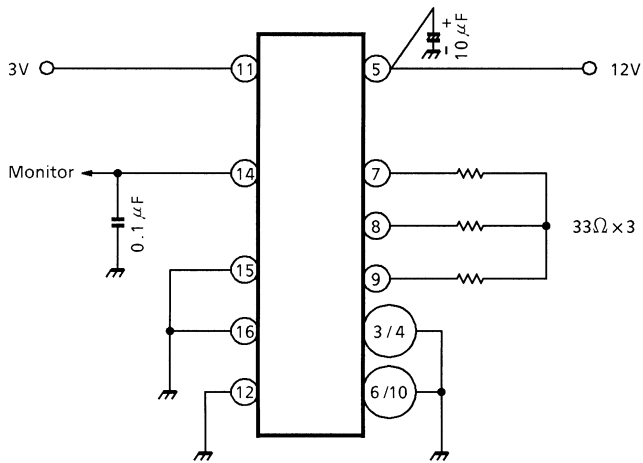
## TEST CIRCUIT 5.

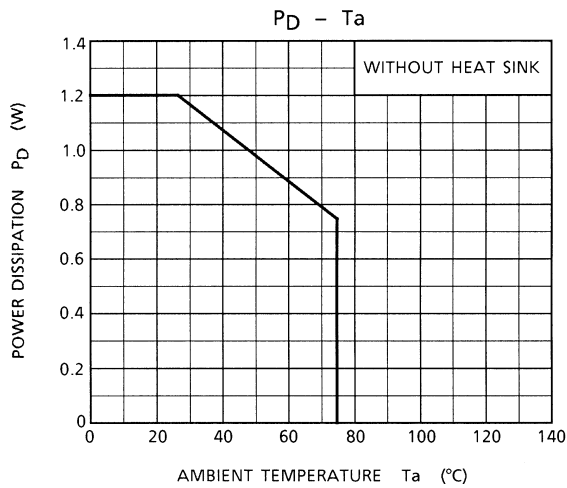


## TEST CIRCUIT 6.

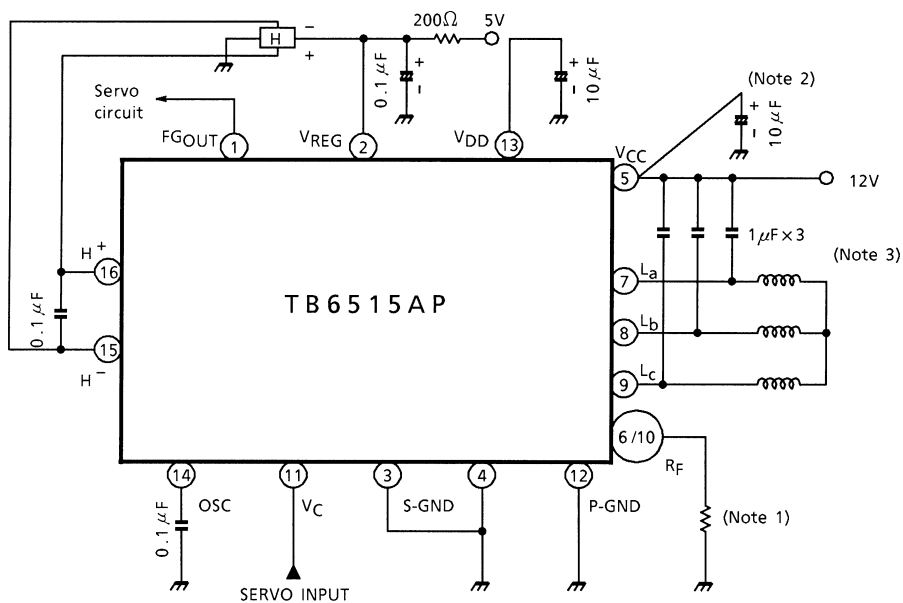


## TEST CIRCUIT 7.





## 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  $\Omega$  should be used.

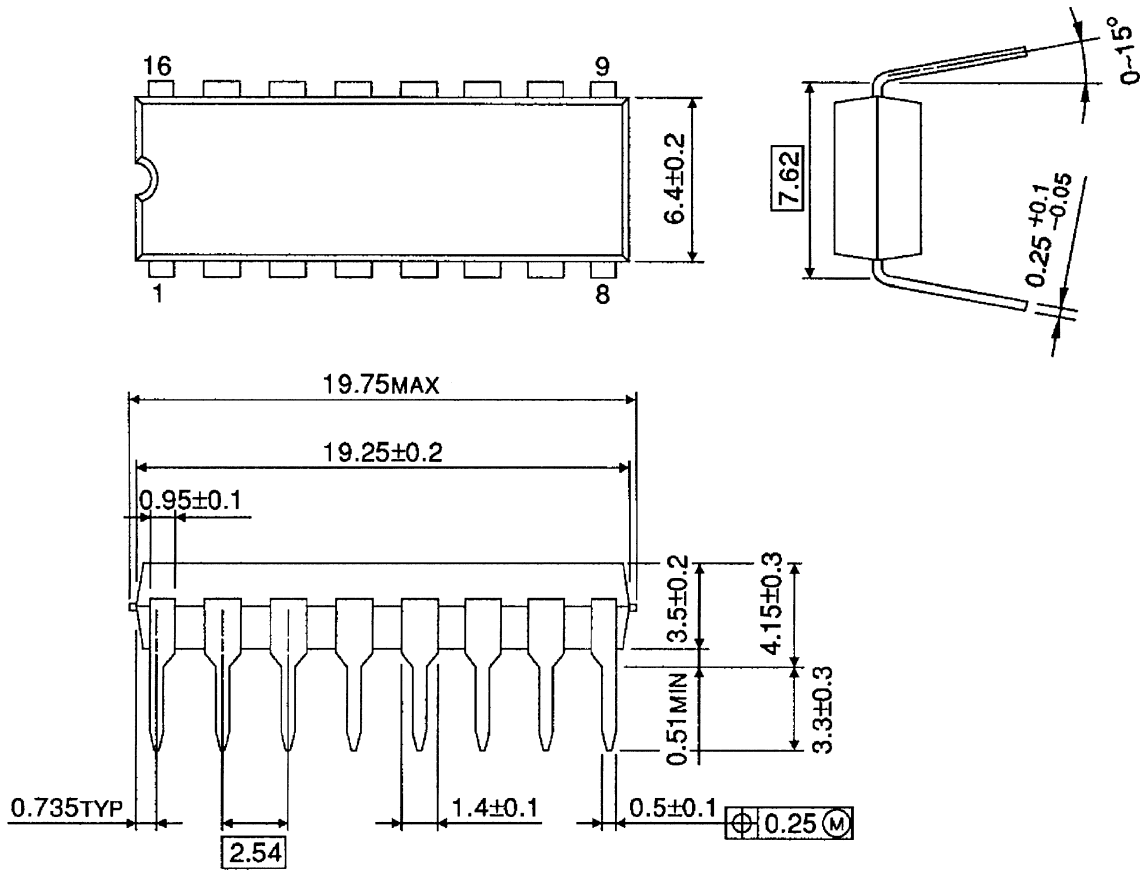
Note 2: It is recommended that the IC pin and GND are connected directly. Ever larger levels of capacity may be required depending on the shared impedance of the power source line.

Note 3: There may be cases where connections (various output  $\rightarrow$  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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