

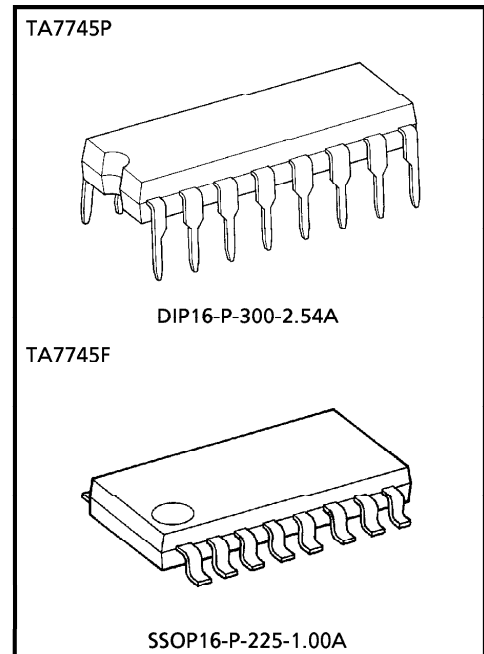
TOSHIBA BIPOLAR LINEAR INTEGRATED CIRCUIT SILICON MONOLITHIC

# TA7745P, TA7745F

## DC MOTOR DRIVER

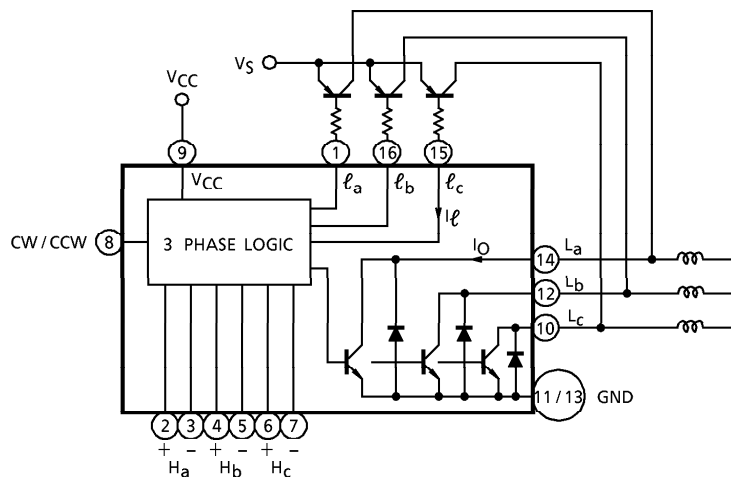
### FEATURES

- 3 Phase Power Driver.
- Voltage Control System.
- High Efficiency is Obtained.
- Capsealed in Flat Package 16Pin.
- Operating Voltage Range :  $V_{CC} = 4.0 \sim 15V$   
 $V_S = 2 \sim 15V$
- High Sensitivity of Position Sensing Inputs and Have a Hysteresis :  $V_H = 20mV_{p-p}$  (Typ.)
- Output Current :  $I_O$  (MAX.) = 1.0A
- Build in Thermal Shut Down Circuit.
- Forward and Reverse Rotation and Stop Modes are Available by Means of Rotation Control Terminal.



Weight  
 DIP16-P-300-2.54A : 1.11g (Typ.)  
 SSOP16-P-225-1.00A : 0.14g (Typ.)

### BLOCK DIAGRAM



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**PIN FUNCTION**

PIN No.	SYMBOL	FUNCTIONAL DESCRIPTION
1	$\ell_a$	a-phase Pre-drive stage 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	CW/CCW	Forward rotation /reverse rotation switch terminal
9	$V_{CC}$	Power Supply input terminal
10	$L_c$	c-phase drive output terminal
11	GND	GND terminal
12	$L_b$	b-phase drive output terminal
13	GND	GND terminal
14	$L_a$	a-phase drive output terminal
15	$\ell_c$	c-phase Pre-drive stage output terminal
16	$\ell_b$	b-phase Pre-drive stage output terminal

**FUNCTION**

FRS ( $\otimes$ PIN)	POSITION SENSING INPUT			COIL OUTPUT		
	$H_a$	$H_b$	$H_c$	$L_a$	$L_b$	$L_c$
$V_{RVS}$	1	0	1	H	L	M
	1	0	0	H	M	L
	1	1	0	M	H	L
	0	1	0	L	H	M
	0	1	1	L	M	H
	0	0	1	M	L	H
$V_{FWD}$	1	0	1	L	H	M
	1	0	0	L	M	H
	1	1	0	M	L	H
	0	1	0	H	L	M
	0	1	1	H	M	L
	0	0	1	M	H	L
$V_{STOP}$	1	0	1	High Impedance		
	1	0	0			
	1	1	0			
	0	1	0			
	0	1	1			
	0	0	1			

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**MAXIMUM RATINGS** (Ta = 25°C)

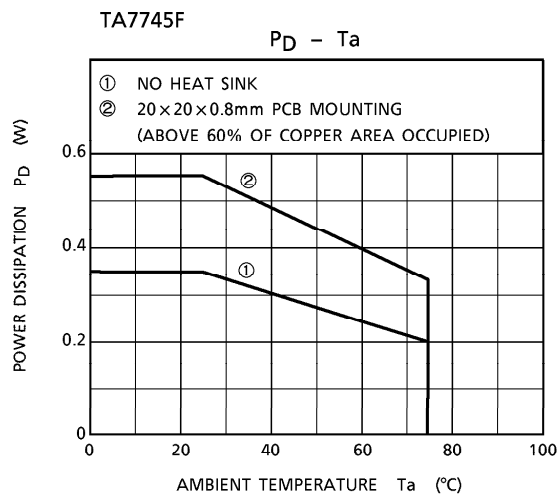
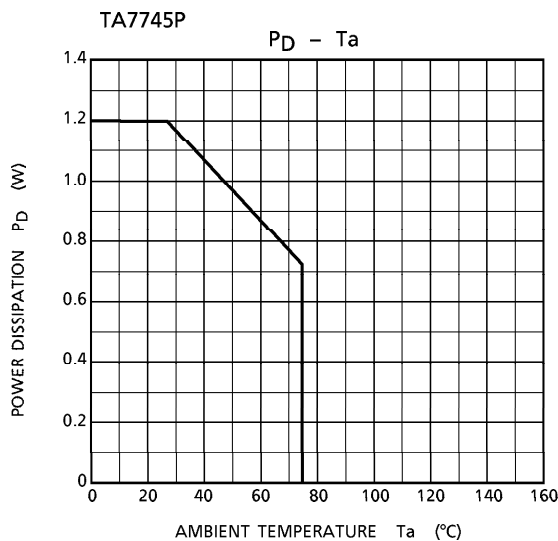
CHARACTERISTIC		SYMBOL	RATING	UNIT
Supply Voltage		V <sub>CC</sub>	18	V
		V <sub>S</sub>	18	V
Output Current		I <sub>O</sub>	1.0	A
		I <sub>ℓ</sub>	20.0	mA
Power Dissipation	TA7745P	P <sub>D</sub>	350	mW
			550 (Note)	
	TA7745F		1200	
Operating Temperature		T <sub>opr</sub>	- 30~75	°C
Storage Temperature		T <sub>stg</sub>	- 55~150	°C

(Note) This rating is obtained by mounting on 20×20×0.8mm PCB that occupied above 60% of copper area.

**ELECTRICAL CHARACTERISTICS** (Unless otherwise specified, Ta = 25°C)

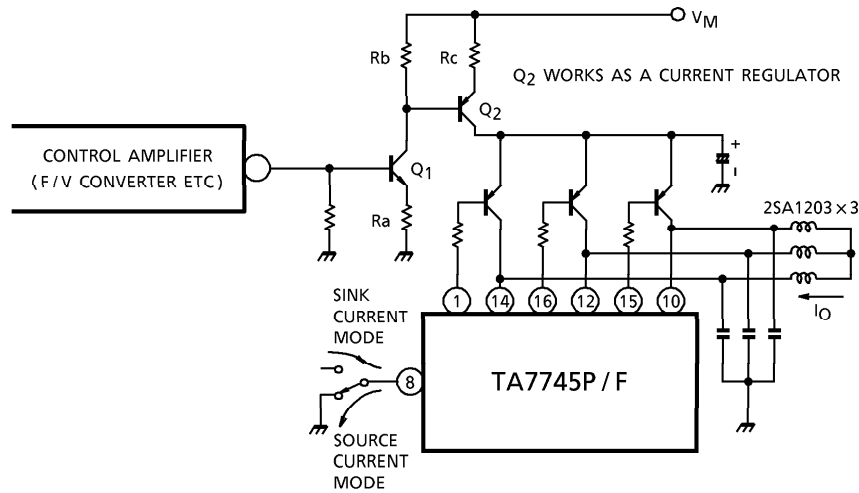
CHARACTERISTIC		SYMBOL	TEST CIR-CUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Supply Current		I <sub>CC1</sub>		V <sub>CC</sub> = 5V, Output "OPEN"	0.5	1	3.0	mA
		I <sub>CC2</sub>		V <sub>CC</sub> = 9V, Output "OPEN"	0.6	1.3	3.5	
		I <sub>CC3</sub>		V <sub>CC</sub> = 12V, Output "OPEN"	0.7	1.5	5.0	
Saturation Voltage	L <sub>a</sub> , L <sub>b</sub> , L <sub>c</sub> Side	V <sub>SL-1</sub>		I <sub>O</sub> = 0.1A	—	0.12	0.3	V
	l <sub>a</sub> , l <sub>b</sub> , l <sub>c</sub> Side	V <sub>SL-2</sub>		I <sub>O</sub> = 0.5A	—	0.5	1.0	
		V <sub>SU</sub>		I <sub>ℓ</sub> = 1.0mA	—	—	0.2	
Position Sensing Input	Sensitivity	V <sub>H</sub>			—	20	—	mV
	Operating DC Level	CMR-H			1	—	V <sub>CC</sub> -1.5	V
Diode Forward Voltage		V <sub>F</sub>		I <sub>F</sub> = 1A	—	2.0	—	V
Rotation Control Input Voltage	Forward	V <sub>FWD</sub>		Source current mode	3.9	—	V <sub>CC</sub>	V
	Stop	V <sub>STOP</sub>		No current flow (Note)	1.8	—	2.6	
	Reverse	V <sub>RVS</sub>		Sink current mode	0	—	0.9	
Saturation Voltage Differential (L <sub>a</sub> , L <sub>b</sub> , L <sub>c</sub> Side)		ΔV <sub>S</sub>		I <sub>O</sub> = 200mA	—	—	50	mV
Leakage Current		I <sub>L</sub>		V = 18V	—	—	50	μA

(Note) IC is stop mode when ③pin supplied 1.8V~2.6V or open.



**APPLICATION CIRCUIT 1**

(3 phase Bi-Pola drive)



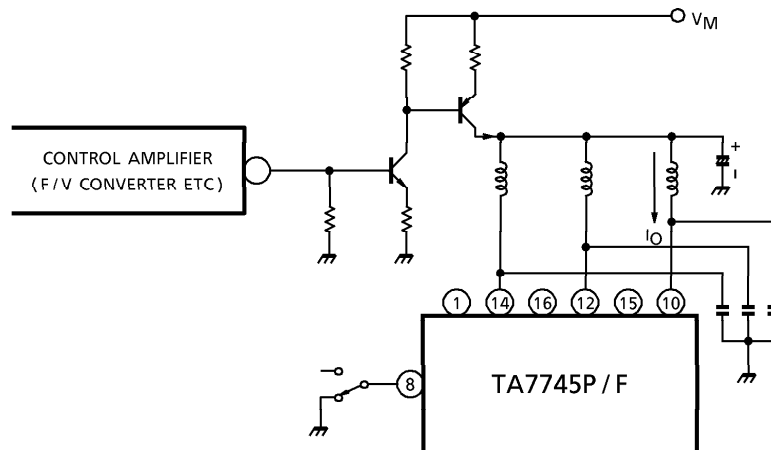
$$I_O \doteq \frac{R_b}{R_a R_c} \cdot V_{IN} - \frac{1}{R_c} \left( \frac{R_b}{R_c} V_{BE1} + V_{BE2} \right)$$

$$\doteq (K_1 \cdot V_{IN}) + K_2$$

(K<sub>1</sub>, K<sub>2</sub> = CONSTANT)

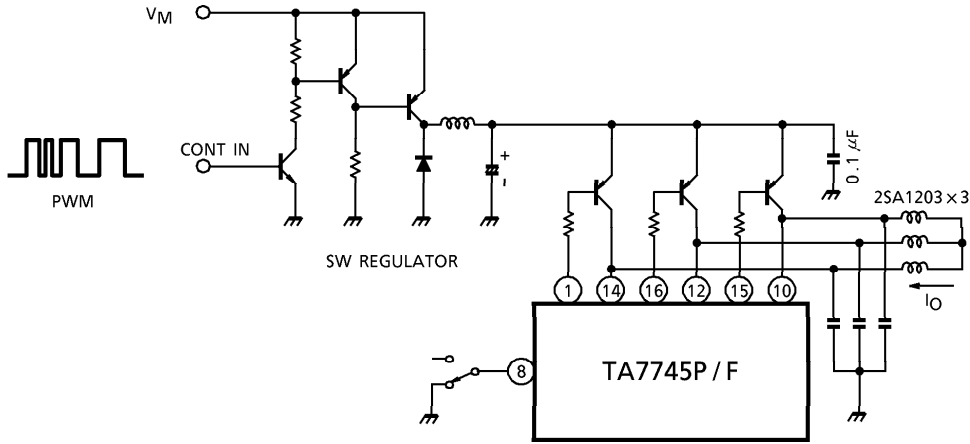
**APPLICATION CIRCUIT 2**

(3 phase UNI-Pola drive)



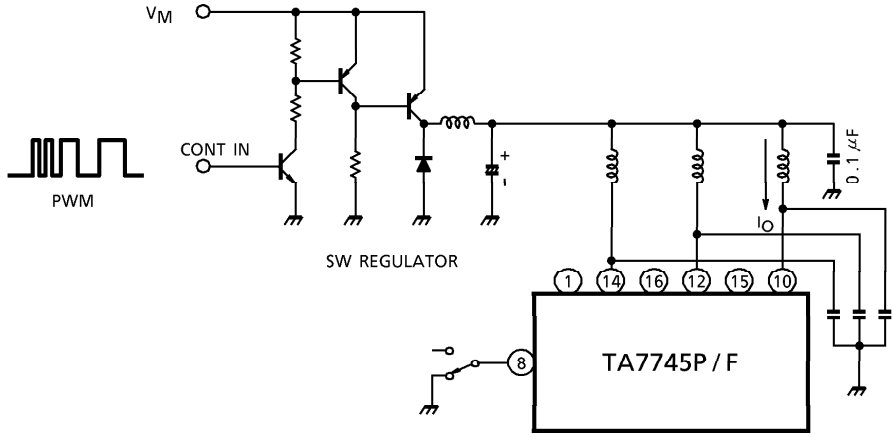
APPLICATION CIRCUIT 3

(High efficiency drive (UNI-Pola))



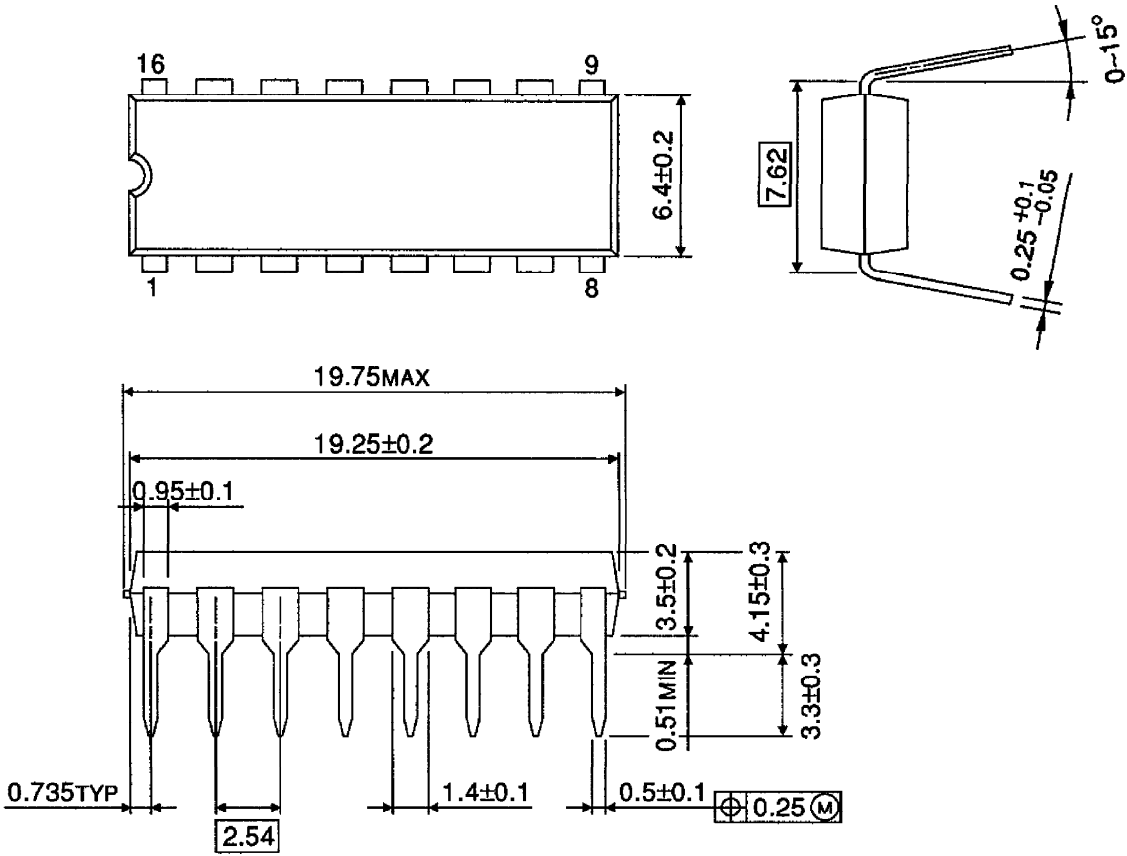
APPLICATION CIRCUIT 4

(High efficiency drive (Bi-Pola))



OUTLINE DRAWING  
DIP16-P-300-2.54A

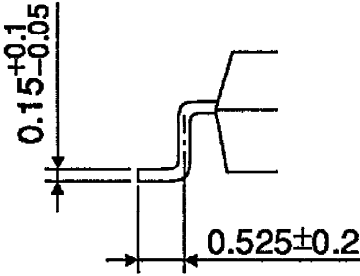
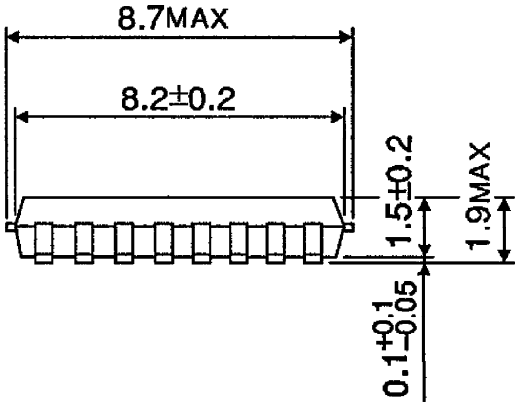
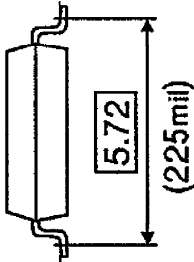
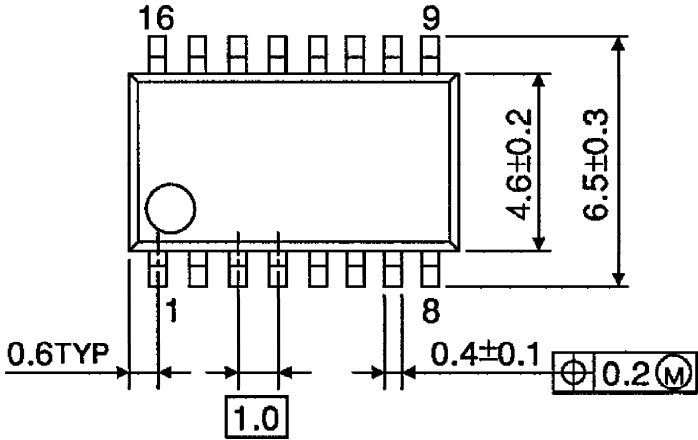
Unit : mm



Weight : 1.11g (Typ.)

OUTLINE DRAWING  
SSOP16-P-225-1.00A

Unit : mm



Weight : 0.14g (Typ.)