

TOSHIBA BIPOLAR LINEAR INTEGRATED CIRCUIT SILICON MONOLITHIC

# TA7774P, TA7774F

## STEPPING MOTOR DRIVER IC

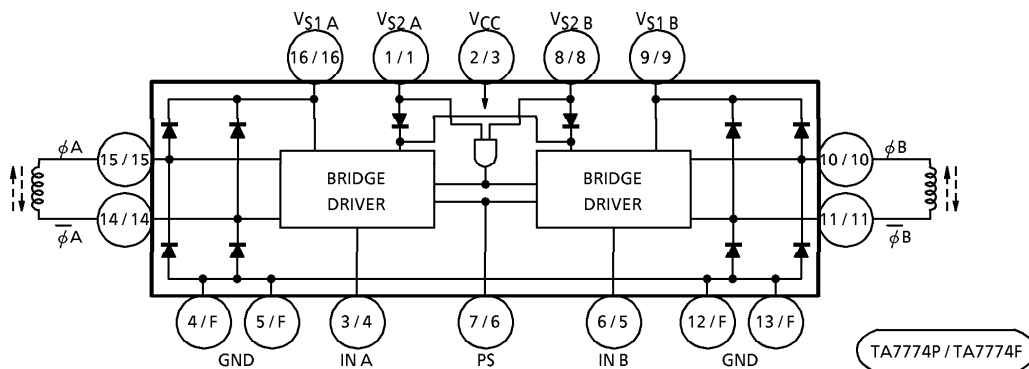
The TA7774P, TA7774F is 2 phase Bipolar stepping motor driver IC designed especially for 3.5 or 5.25 inches FDD head actuator drives.

It consists of TTL compatible input circuit, dual bridge driver outputs with flyback diodes, changing circuit of motor coil drive voltage (Power saving circuit) and stand-by circuit.

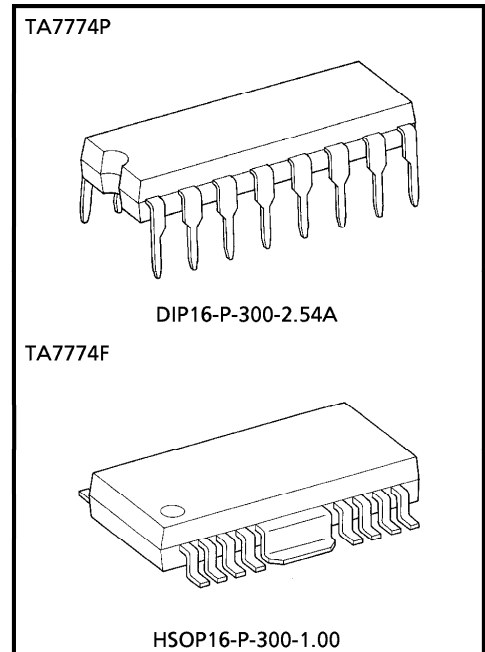
### FEATURES

- One Chip 2 Phase Bipolar Stepping Motor Driver.
- Power Saving and Stand-by Operation are available.  
I stand-by (I<sub>CC3</sub>) ≤ 115 μA
- Build-in Punch Through Current Restriction Circuit for System Reliability and Noise Suppression.
- TTL Compatible Inputs
- Surface Mount is available with F Type.
- Output Current up to 0.4 A (peak)

### BLOCK DIAGRAM



(Note) Pin ②, ⑦, ⑩, ⑬ of TA7774F are all NC and Heat Fin is connected to GND.



Weight  
 DIP16-P-300-2.54A : 1.11 g (Typ.)  
 HSOP16-P-300-1.00 : 0.50 g (Typ.)

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**PIN FUNCTION**

PIN No.	SYMBOL	FUNCTIONAL DESCRIPTION
1/(1)	V <sub>S2 A</sub>	Low-voltage power supply terminal
2/(3)	V <sub>CC</sub>	Power voltage supply terminal for control
3/(4)	IN A	A-ch forward rotation / reverse rotation signal input terminal
4/(F)	GND	GND terminal
5/(F)	GND	GND terminal
6/(5)	IN B	B-ch forward rotation / reverse rotation signal input terminal
7/(6)	PS	Powersave signal input terminal
8/(8)	V <sub>S2 B</sub>	Stand-by signal input terminal
9/(9)	V <sub>S1 B</sub>	High-voltage power supply terminal
10/(10)	$\phi$ B	Output B
11/(11)	$\phi$ $\bar{B}$	Output $\bar{B}$
12/(F)	GND	GND terminal
13/(F)	GND	GND terminal
14/(14)	$\phi$ $\bar{A}$	Output $\bar{A}$
15/(15)	$\phi$ A	Output A
16/(16)	V <sub>S1 A</sub>	High-voltage power supply terminal.

( ) : TA7774F

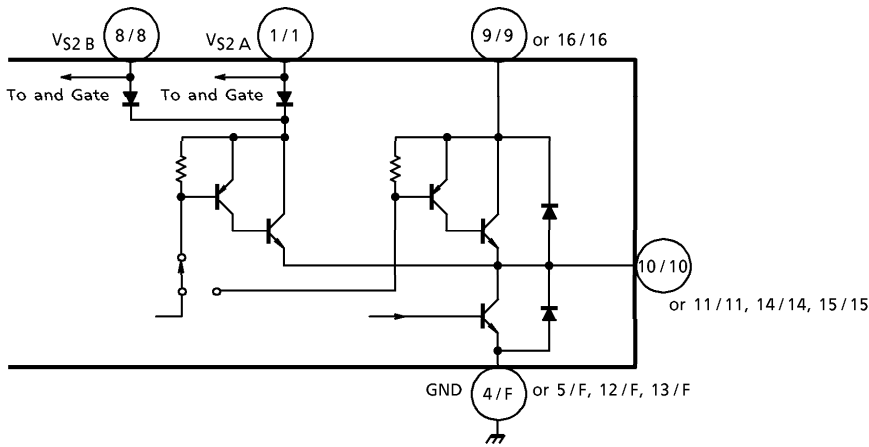
**TRUTH TABLE 1**

INPUT		OUTPUT		
PS	IN	$\phi$	$\bar{\phi}$	
L	L	L	H	Enable V <sub>S1</sub>
L	H	H	L	Enable V <sub>S1</sub>
H	L	L	H	Enable V <sub>S2</sub> (Power save)
H	H	H	L	Enable V <sub>S2</sub> (Power save)

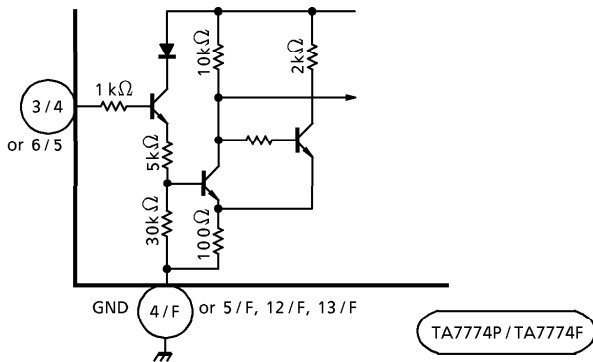
**TRUTH TABLE 2**

V <sub>S2 B</sub>	
L	Power Off (stand-by)
H	Operation

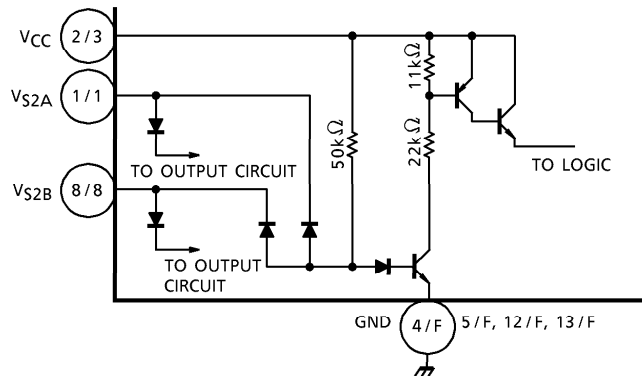
OUTPUT CIRCUIT



INPUT CIRCUIT IN A, IN B



INPUT CIRCUIT VS2 A or VS2 B



MAXIMUM RATINGS (Ta = 25°C)

CHARACTERISTIC		SYMBOL	RATING	UNIT
Supply Voltage		V <sub>CC</sub>	7.0	V
		V <sub>S1</sub>	17.0	
		V <sub>S2</sub>	~V <sub>CC</sub>	
Output Current		I <sub>O</sub> (PEAK)	± 400	mA
		I <sub>O</sub> (START)	± 350	
		I <sub>O</sub> (HOLD)	± 100	
Input Voltage		V <sub>IN</sub>	~V <sub>CC</sub>	V
Power Dissipation	TA7774P TA7774F	P <sub>D</sub>	(Note 1) 1.4	W
			(Note 2) 2.7	
			(Note 3) 1.4	
Operating Temperature		T <sub>opr</sub>	- 30~75	°C
Storage Temperature		T <sub>stg</sub>	- 55~150	°C

- (Note 1) No heat sink
- (Note 2) This value is obtained by 50 × 50 × 0.8 mm PCB mounting occupied copper area in excess of 60%.
- (Note 3) This value is obtained by 60 × 30 × 1.6 mm PCB mounting occupied copper area in excess of 50%.

## ELECTRICAL CHARACTERISTICS

(Unless otherwise specified,  $T_a = 25^\circ\text{C}$ ,  $V_{CC} = 5\text{V}$ ,  $V_{S1} = 12\text{V}$ ,  $V_{S2A} = 5\text{V}$ )

CHARACTERISTIC	SYMBOL	TEST CIR-CUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT	
Supply Current	$I_{CC1}$	1	PS : H, $V_{S2}$ : H	—	9	14	mA	
	$I_{CC2}$		PS : L, $V_{S2}$ : H	—	8.5	13		
	$I_{CC3}$		$V_{S2}$ : L	70	90	115	$\mu\text{A}$	
Input Voltage	$V_{IN H}$	—	$T_j = 25^\circ\text{C}$ $V_{S2}$ : H	Pin ③, ⑥	2.0	—	$V_{CC}$	V
	$V_{IN L}$				GND	—	0.8	
	$V_{PS H}$			Pin ⑦	2.0	—	$V_{CC}$	
	$V_{PS L}$				GND	—	0.8	
	$V_{S2 BH}$		$T_j = 25^\circ\text{C}$	Pin ⑧	3.5	—	$V_{CC}$	
	$V_{S2 BL}$				GND	—	0.4	
Input Current	$I_{IN}$	1	$T_j = 25^\circ\text{C}$ , $V_{S2}$ : H $V_{IN}/PS$ (2 V) : Sink current	Pin ③, ⑥	—	2.6	30	$\mu\text{A}$
	$I_{PS}$			Pin ⑦	—	2.6	30	
Output Saturation Voltage	$V_{SAT 1H1}$	2	PS : L, $V_{S2}$ : H	$I_{OUT} = 100\text{ mA}$	—	0.9	—	V
	$V_{SAT 1H2}$			$I_{OUT} = 400\text{ mA}$	—	1.2	1.5	
	$V_{SAT 2H1}$	3	PS : H, $V_{S2}$ : H	$I_{OUT} = 20\text{ mA}$	—	1.6	—	
	$V_{SAT 2H2}$			$I_{OUT} = 100\text{ mA}$	—	1.8	2.1	
	$V_{SAT L1}$	2	$V_{S2}$ : H	$I_{OUT} = 20\text{ mA}$	—	0.03	—	
	$V_{SAT L2}$			$I_{OUT} = 100\text{ mA}$	—	0.15	—	
	$V_{SAT L3}$			$I_{OUT} = 400\text{ mA}$	—	0.35	0.6	
Diode Forward Voltage	$V_{FU}$	4	$I_F = 350\text{ mA}$	—	1.5	—	V	
	$V_{FL}$			—	1.0	—		
Delay Time	$t_{pLH}$	—	IN - $\phi$	—	7	—	$\mu\text{s}$	
	$t_{pHL}$			—	2	—		
Operating Voltage	$V_{CC(opr.)}$	—	$V_{CC} = ST$	4.5	5.0	7.0	V	

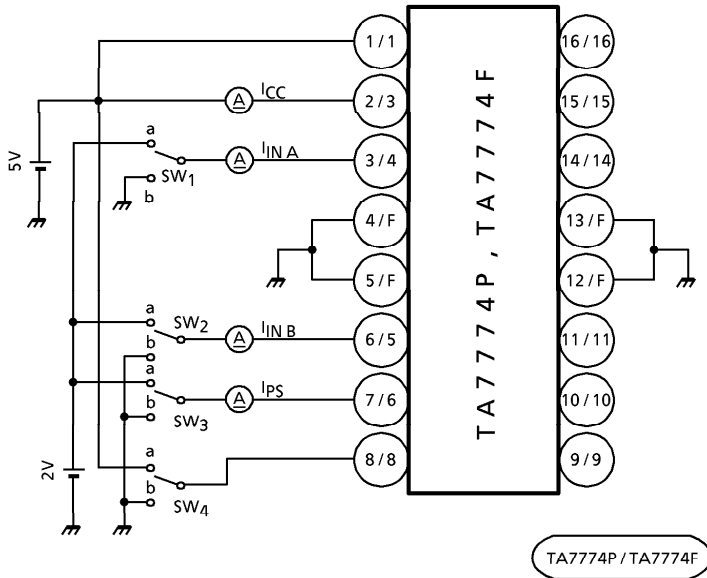
Recommendable Operating Voltage

 $V_{S1(opr.)} = 12\text{V} \pm 10\%$  $V_{S2A(opr.)} = 5\text{V} \pm 10\%$ 

Operating Voltage Restriction

 $V_{S1} \geq V_{S2A}$

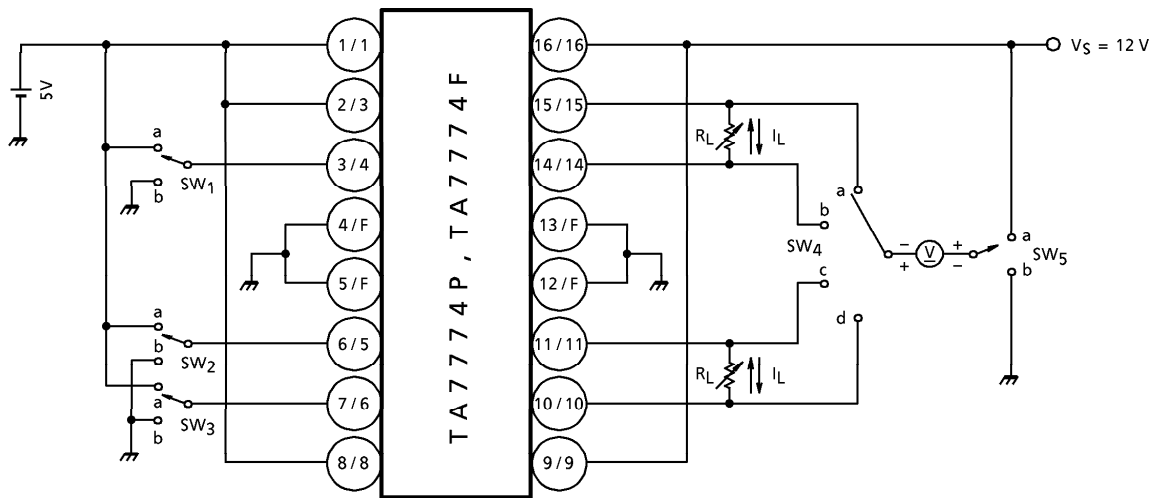
TEST CIRCUIT 1  $I_{CC1}$ ,  $I_{CC2}$ ,  $I_{CC3}$ ,  $I_{IN A}$ ,  $I_{IN B}$ ,  $I_{PS}$



ITEM	SW <sub>1</sub>	SW <sub>2</sub>	SW <sub>3</sub>	SW <sub>4</sub>
$I_{CC1}$	b	b	a	a
$I_{CC2}$	b	b	b	a
$I_{CC3}$	b	b	—	b
$I_{IN A}$	a	—	—	a
$I_{IN B}$	—	a	—	a
$I_{PS}$	—	—	a	a

TA7774P / TA7774F

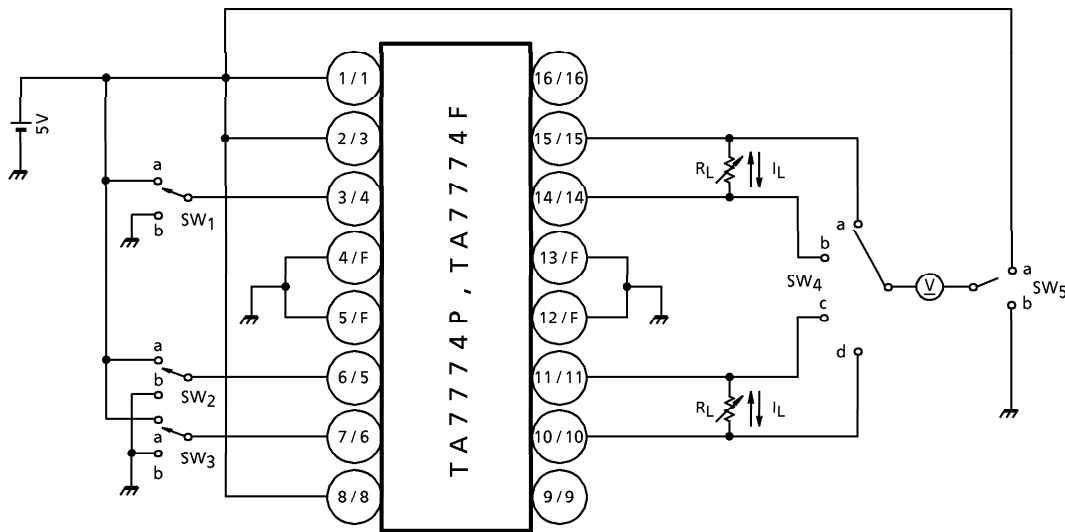
**TEST CIRCUIT 2**  $V_{SAT\ 1H1}$ ,  $V_{SAT\ 1H2}$ ,  $V_{SAT\ L2}$ ,  $V_{SAT\ L3}$



(\*) Calibrate  $I_L$  to 0.4/0.1 A by  $R_L$ .

ITEM	SW <sub>1</sub>	SW <sub>2</sub>	SW <sub>3</sub>	SW <sub>4</sub>	SW <sub>5</sub>	$I_L$ (mA)
$V_{SAT\ 1H1}$	a	—	b	a	a	100
	b	—		b		
	—	a		d		
	—	b		c		
$V_{SAT\ 1H2}$	a	—	b	a	a	400
	b	—		b		
	—	a		d		
	—	b		c		
$V_{SAT\ L2}$	a	—	—	b	b	100
	b	—		a		
	—	a		c		
	—	b		d		
$V_{SAT\ L3}$	a	—	b	b	b	400
	b	—		a		
	—	a		c		
	—	b		d		

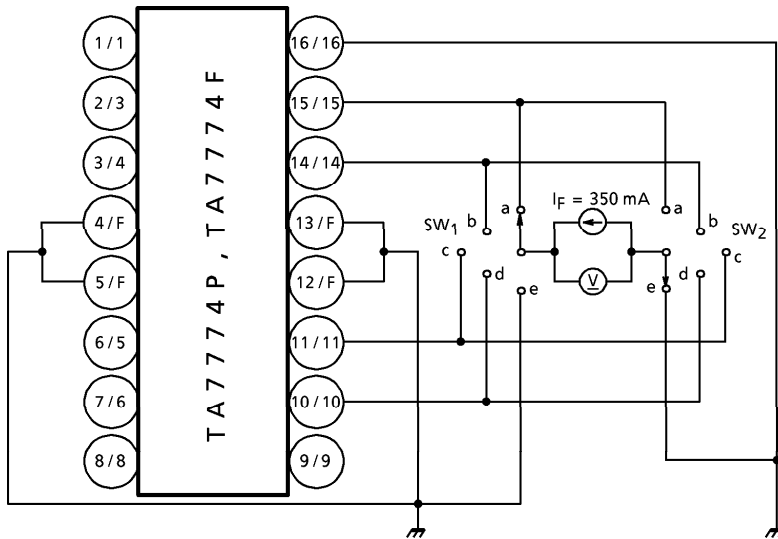
TEST CIRCUIT 3  $V_{SAT\ 2H1}$ ,  $V_{SAT\ 2H2}$ ,  $V_{SAT\ L1}$



(\*) Calibrate  $I_L$  to 20/100 mA by  $R_L$ .

ITEM	SW <sub>1</sub>	SW <sub>2</sub>	SW <sub>3</sub>	SW <sub>4</sub>	SW <sub>5</sub>	$I_L$ (mA)
$V_{SAT\ 2H1}$	a	—	a	a	a	20
	b	—		b		
	—	a		c		
	—	b		d		
$V_{SAT\ 2H2}$	a	—	a	a	a	100
	b	—		b		
	—	a		c		
	—	b		d		
$V_{SAT\ L1}$	a	—	a	b	b	20
	b	—		a		
	—	a		c		
	—	b		d		

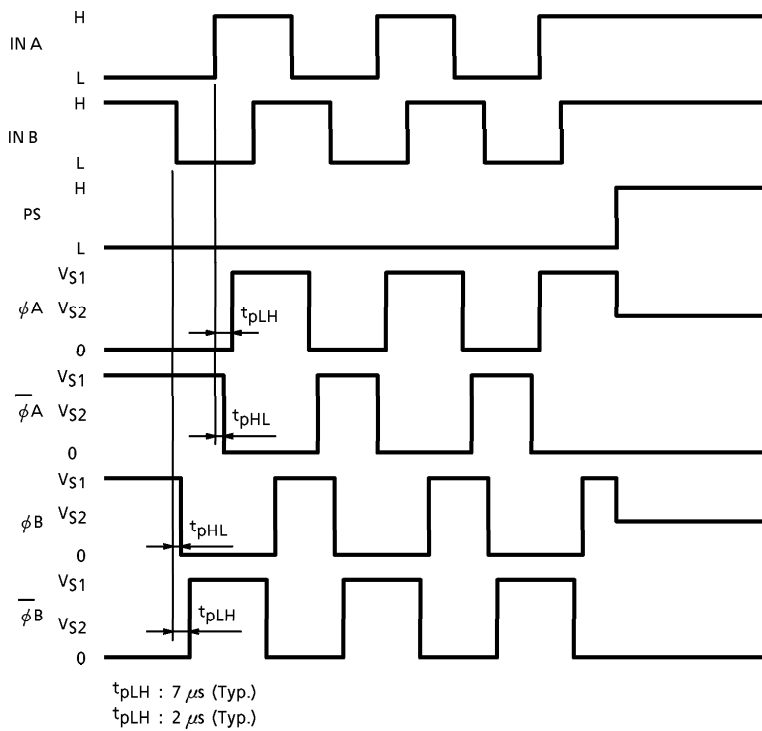
**TEST CIRCUIT 4**  $V_{FU}$ ,  $V_{FL}$



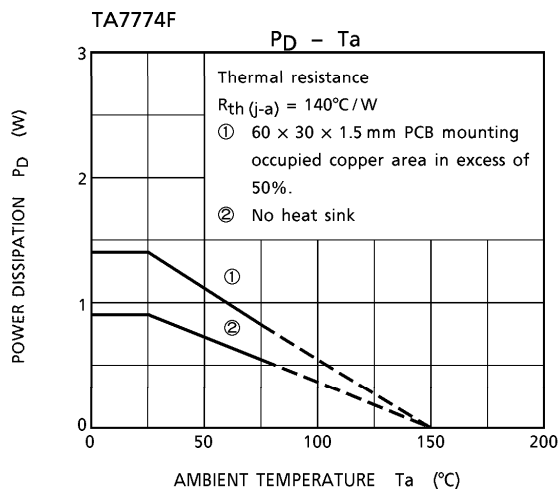
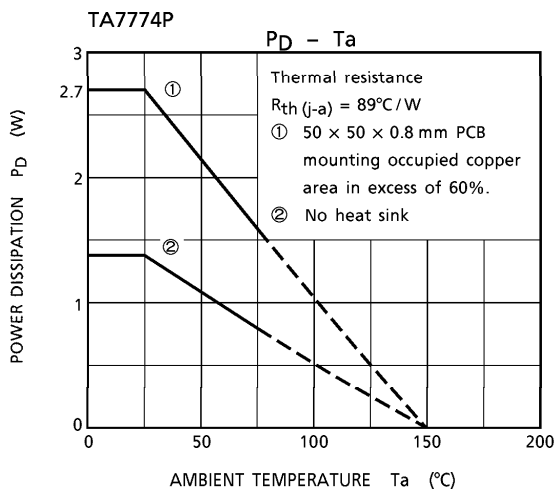
**MEASURING METHOD**

ITEM	SW <sub>1</sub>	SW <sub>2</sub>
$V_{FU}$	a	e
	b	
	c	
	d	
$V_{FL}$	e	a
		b
		c
		d

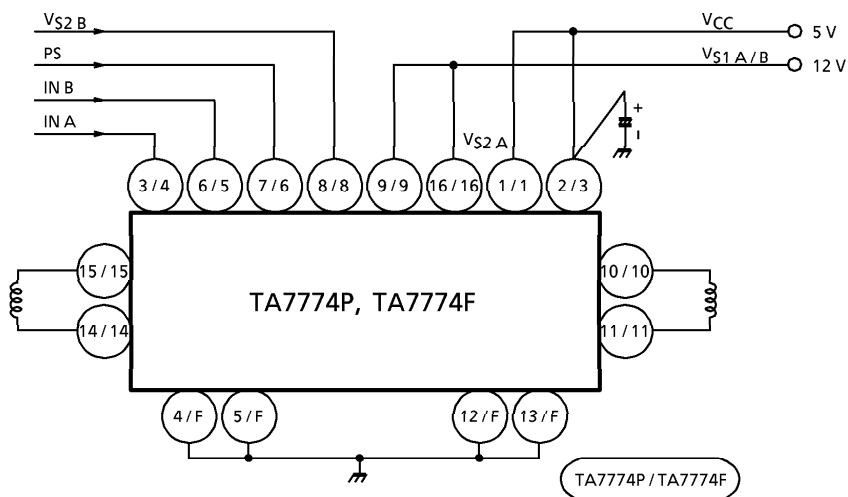
**TIMING CHART (2 phase excitation)**







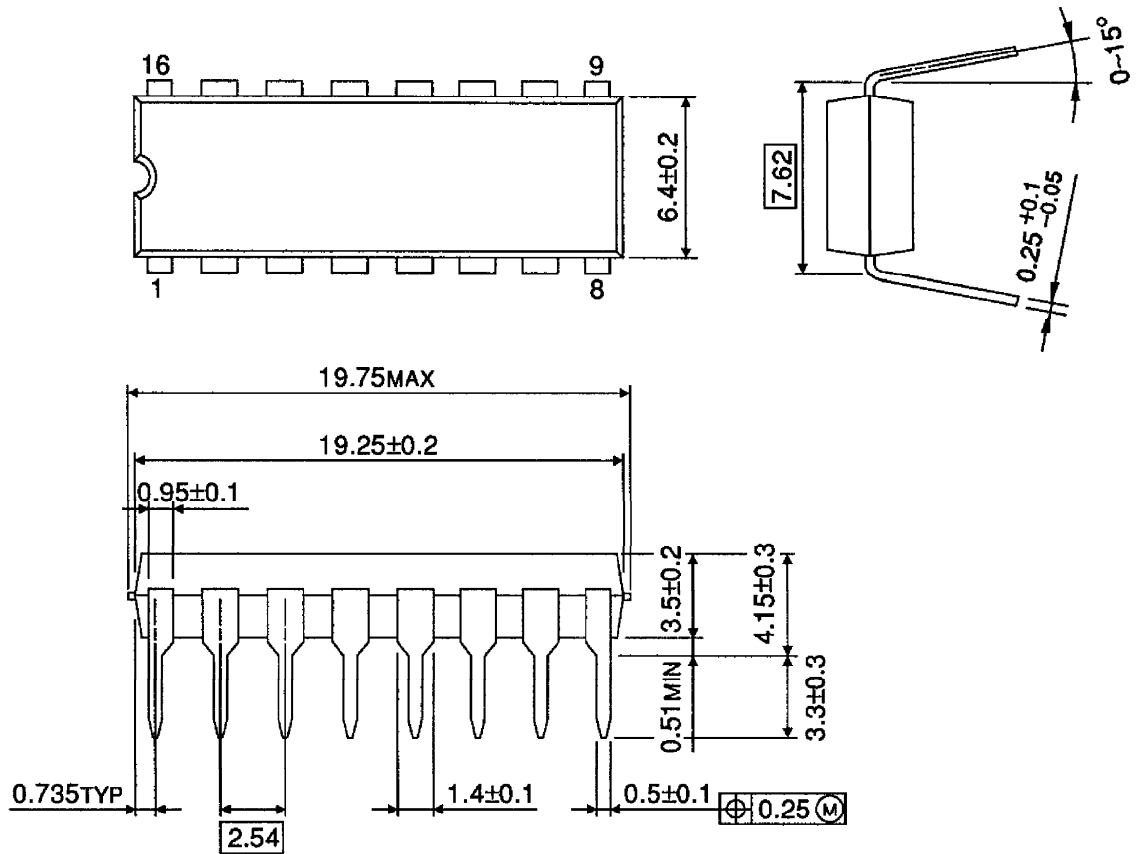
APPLICATION CIRCUIT



(Note) Utmost care is necessary in the design of the output line,  $V_S$  and GND line since IC may be destroyed due to short-circuit between outputs, air contamination fault, or fault by improper grounding.

**OUTLINE DRAWING**  
DIP16-P-300-2.54A

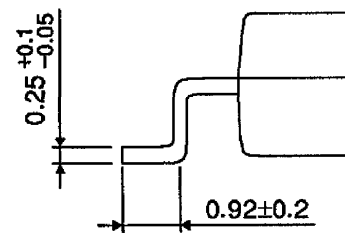
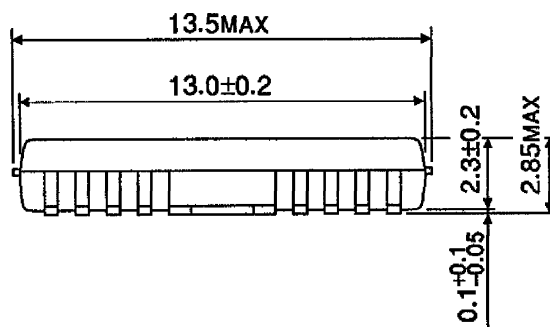
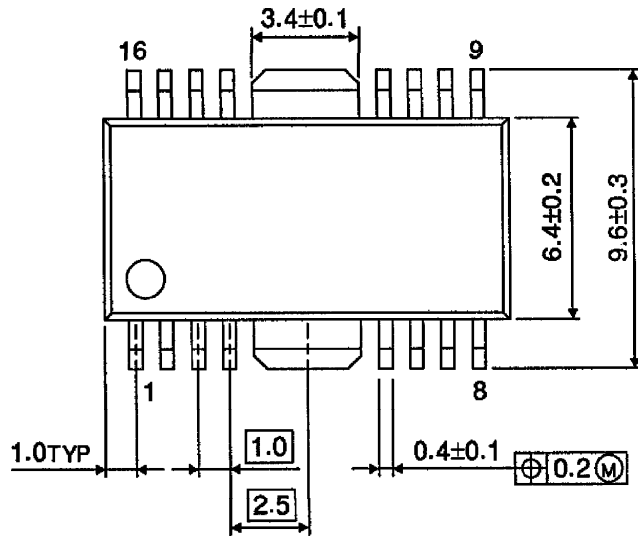
Unit : mm



Weight : 1.11 g (Typ.)

**OUTLINE DRAWING**  
HSOP16-P-300-1.00

Unit : mm



Weight : 0.50 g (Typ.)