

TOSHIBA

TA7774P/F

TOSHIBA BIPOLAR LINEAR INTEGRATED CIRCUIT SILICON MONOLITHIC

TA7774P, TA7774F

STEPPING MOTOR DRIVER IC

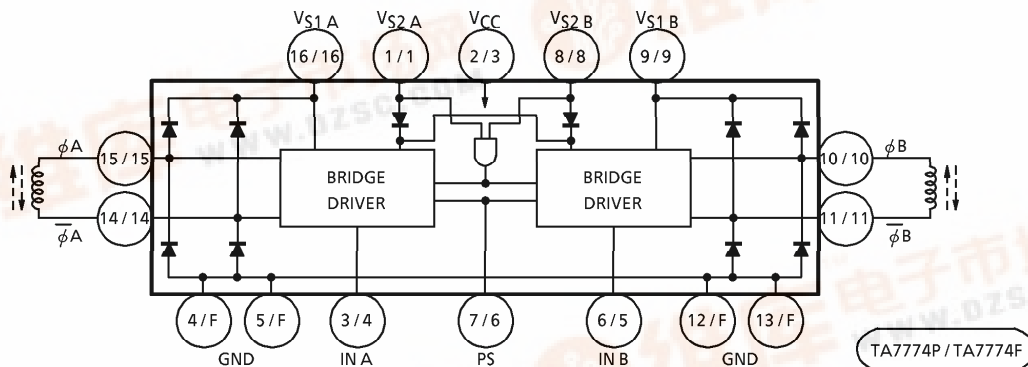
The TA7774P, TA7774F is 2 phase Bipolar stepping motor driver IC designed especially for 3.5 or 5.25 inches FDD head actuator drives.

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

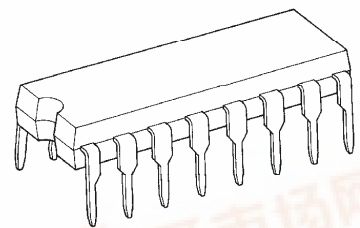
- One Chip 2 Phase Bipolar Stepping Motor Driver.
- Power Saving and Stand-by Operation are available.
I stand-by (I_{CC3}) $\leq 115 \mu A$
- Build-in Punch Through Current Restriction Circuit for System Reliability and Noise Suppression.
- TTL Compatible Inputs
- Surface Mount is available with F Type.
- Output Current up to 0.4 A (peak)

BLOCK DIAGRAM



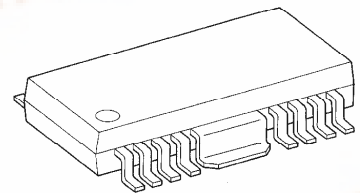
(Note) Pin ②, ⑦, ⑫, ⑬ of TA7774F are all NC and Heat Fin is connected to GND.

TA7774P



DIP16-P-300-2.54A

TA7774F



HSOP16-P-300-1.00

Weight

DIP16-P-300-2.54A : 1.11 g (Typ.)

HSOP16-P-300-1.00 : 0.50 g (Typ.)

980910EBA2

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PIN FUNCTION

PIN No.	SYMBOL	FUNCTIONAL DESCRIPTION
1/(1)	V _{S2} A	Low-voltage power supply terminal
2/(3)	V _{CC}	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 _{S2} B	Stand-by signal input terminal
9/(9)	V _{S1} B	High-voltage power supply terminal
10/(10)	ϕ B	Output B
11/(11)	ϕ $\bar{B}$	Output $\bar{B}$
12/(F)	GND	GND terminal
13/(F)	GND	GND terminal
14/(14)	ϕ A	Output A
15/(15)	ϕ A	Output A
16/(16)	V _{S1} A	High-voltage power supply terminal.

() : TA7774F

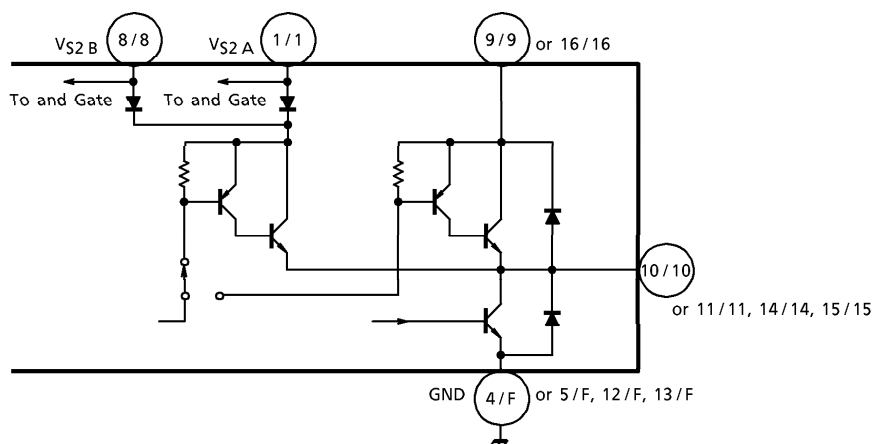
TRUTH TABLE 1

INPUT		OUTPUT		
PS	IN	ϕ	$\bar{\phi}$	
L	L	L	H	Enable V _{S1}
L	H	H	L	Enable V _{S1}
H	L	L	H	Enable V _{S2} (Power save)
H	H	H	L	Enable V _{S2} (Power save)

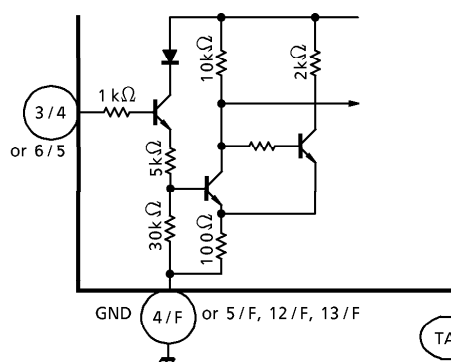
TRUTH TABLE 2

V _{S2} B	
L	Power Off (stand-by)
H	Operation

OUTPUT CIRCUIT

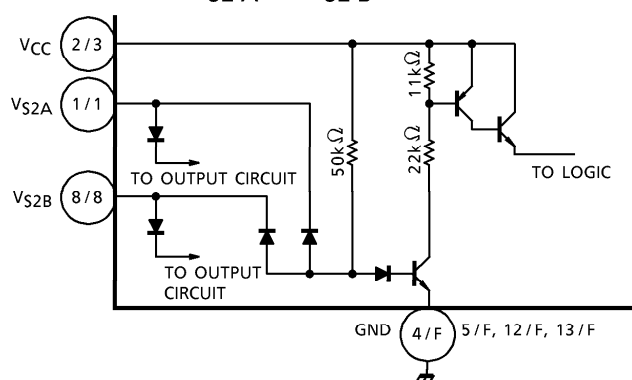


INPUT CIRCUIT IN A, IN B



TA7774P/TA7774F

INPUT CIRCUIT VS2 A or VS2 B



MAXIMUM RATINGS (Ta = 25°C)

CHARACTERISTIC		SYMBOL	RATING	UNIT
Supply Voltage		V _{CC}	7.0	V
		V _{S1}	17.0	
		V _{S2}	~V _{CC}	
Output Current		I _O (PEAK)	± 400	mA
		I _O (START)	± 350	
		I _O (HOLD)	± 100	
Input Voltage		V _{IN}	~V _{CC}	V
Power Dissipation	TA7774P	P _D	(Note 1) 1.4	W
	TA7774F		(Note 2) 2.7	
			(Note 3) 1.4	
Operating Temperature		T _{opr}	-30~75	°C
Storage Temperature		T _{stg}	-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
	PS : L, V _{S2} : H		—	8.5	13			
	I _{CC3}		V _{S2} : L		70	90	115	μA
Input Voltage	V _{INH}	—	T _j = 25°C V _{S2} : H	Pin ③, ⑥	2.0	—	V _{CC}	V
	V _{INL}				GND	—	0.8	
	V _{PSH}			Pin ⑦	2.0	—	V _{CC}	
	V _{PSL}				GND	—	0.8	
	V _{S2BH}		T _j = 25°C	Pin ⑧	3.5	—	V _{CC}	
	V _{S2BL}				GND	—	0.4	
	Input Current	I _{IN}	1	T _j = 25°C, V _{S2} : H V _{IN} / PS (2 V) : Sink current	Pin ③, ⑥	—	2.6	
I _{PS}		Pin ⑦			—	2.6	30	
Output Saturation Voltage	V _{SAT 1H1}	2	PS : L, V _{S2} : H	I _{OUT} = 100 mA	—	0.9	—	V
	V _{SAT 1H2}			I _{OUT} = 400 mA	—	1.2	1.5	
	V _{SAT 2H1}	3	PS : H, V _{S2} : H	I _{OUT} = 20 mA	—	1.6	—	
	V _{SAT 2H2}			I _{OUT} = 100 mA	—	1.8	2.1	
	V _{SAT L1}	2	V _{S2} : H	I _{OUT} = 20 mA	—	0.03	—	
	V _{SAT L2}			I _{OUT} = 100 mA	—	0.15	—	
	V _{SAT L3}			I _{OUT} = 400 mA	—	0.35	0.6	
Diode Forward Voltage	V _{F U}	4	I _F = 350 mA		—	1.5	—	V
	V _{F L}				—	1.0	—	
Delay Time	t _{pLH}	—	IN − ϕ		—	7	—	μs
	t _{pHL}				—	2	—	
Operating Voltage	V _{CC (opr.)}	—	V _{CC} = ST		4.5	5.0	7.0	V

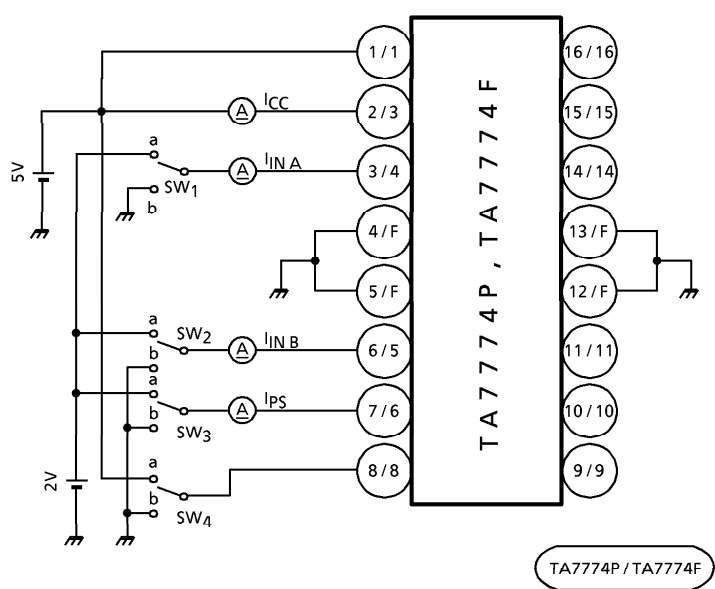
Recommendable Operating Voltage

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

Operating Voltage Restriction

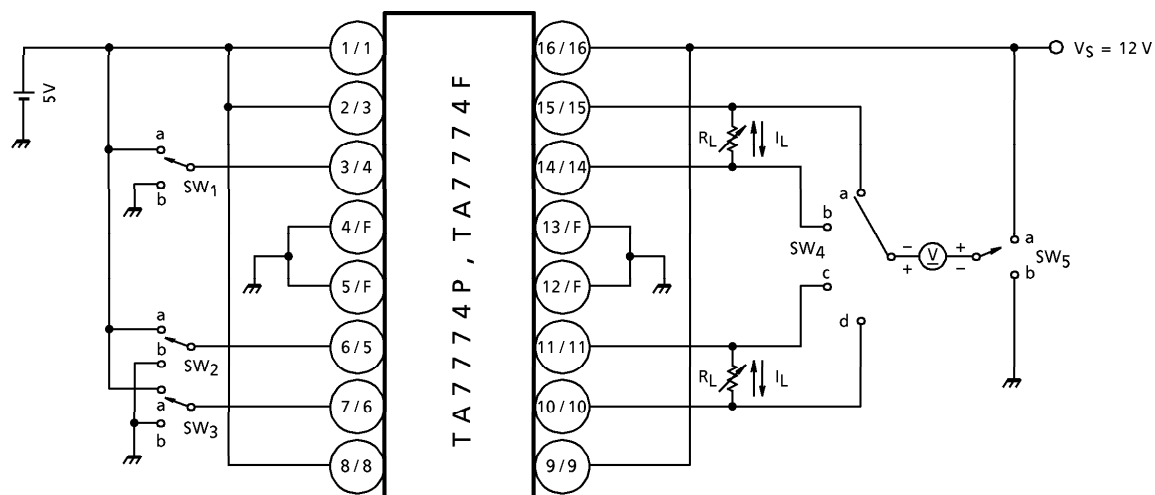
 $V_{S2A(opr.)} \ 5\text{ V} \pm 10\%$ $V_{S1} \geq V_{S2A}$

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



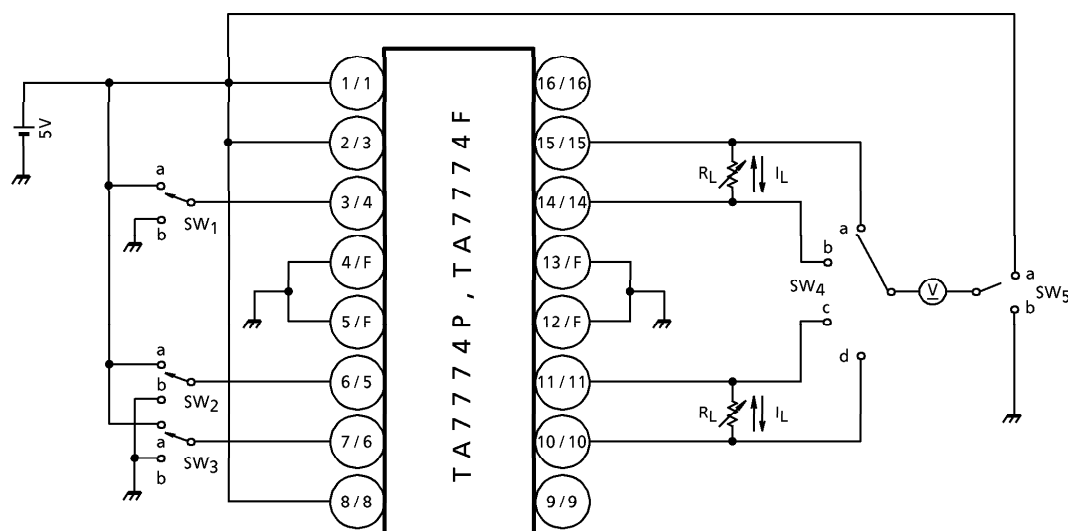
ITEM	SW ₁	SW ₂	SW ₃	SW ₄
I_{CC1}	b	b	a	a
I_{CC2}	b	b	b	a
I_{CC3}	b	b	—	b
$I_{IN A}$	a	—	—	a
$I_{IN B}$	—	a	—	a
I_{PS}	—	—	a	a

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 .

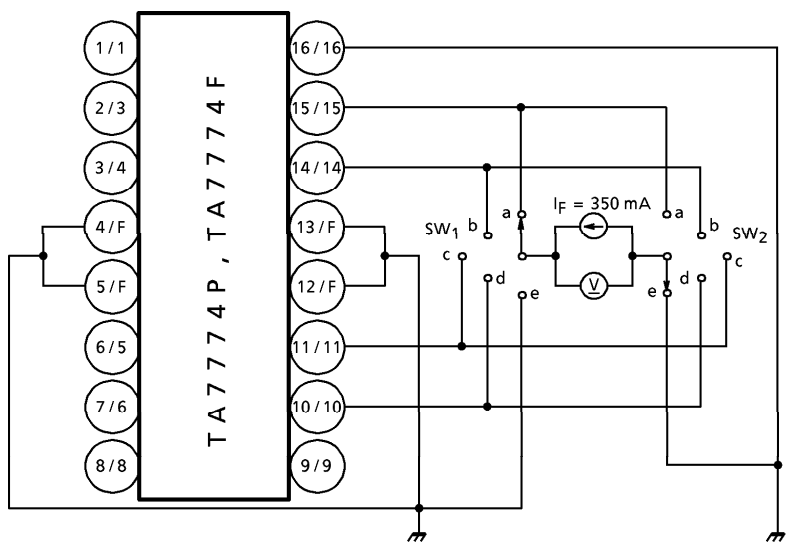
ITEM	SW ₁	SW ₂	SW ₃	SW ₄	SW ₅	I_L (mA)
$V_{SAT\ 1H1}$	a	—	b	a	a	100
	b	—		b		
	—	a		d		
	—	b		c		
$V_{SAT\ 1H2}$	a	—	b	a	a	400
	b	—		b		
	—	a		d		
	—	b		c		
$V_{SAT\ L2}$	a	—	—	b	b	100
	b	—		a		
	—	a		c		
	—	b		d		
$V_{SAT\ L3}$	a	—	b	b	b	400
	b	—		a		
	—	a		c		
	—	b		d		

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

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

ITEM	SW ₁	SW ₂	SW ₃	SW ₄	SW ₅	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		

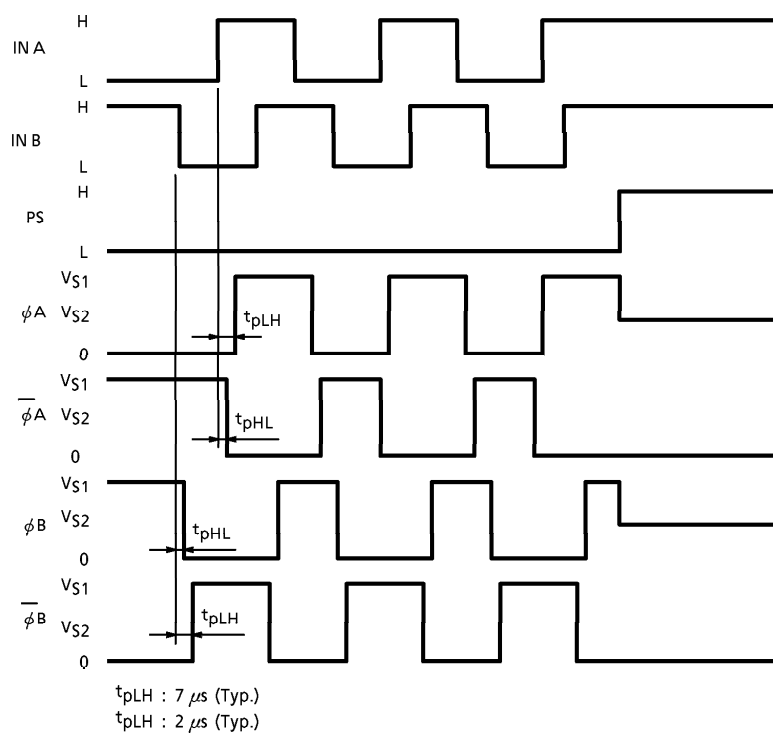
TEST CIRCUIT 4 V_{FU} , V_{FL}

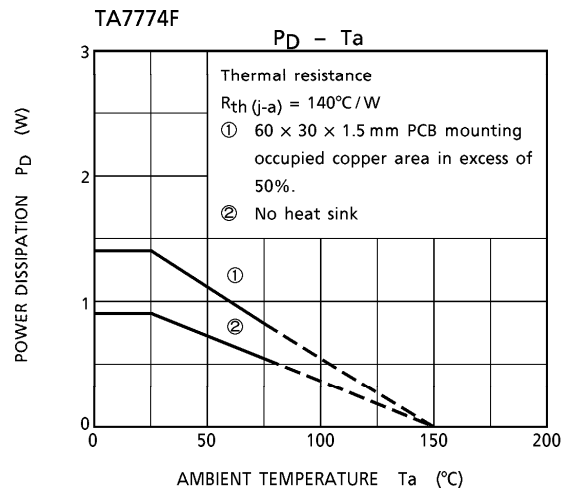
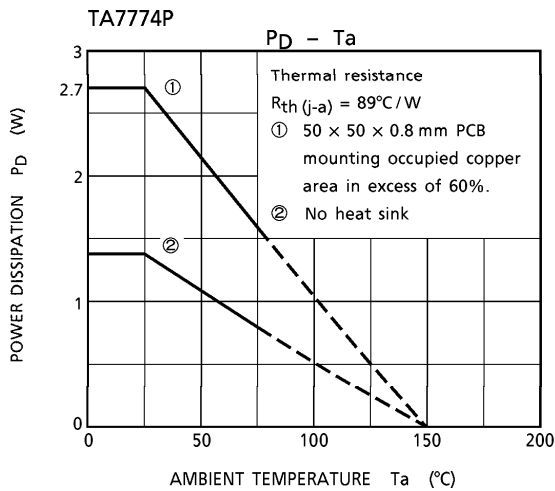


MEASURING METHOD

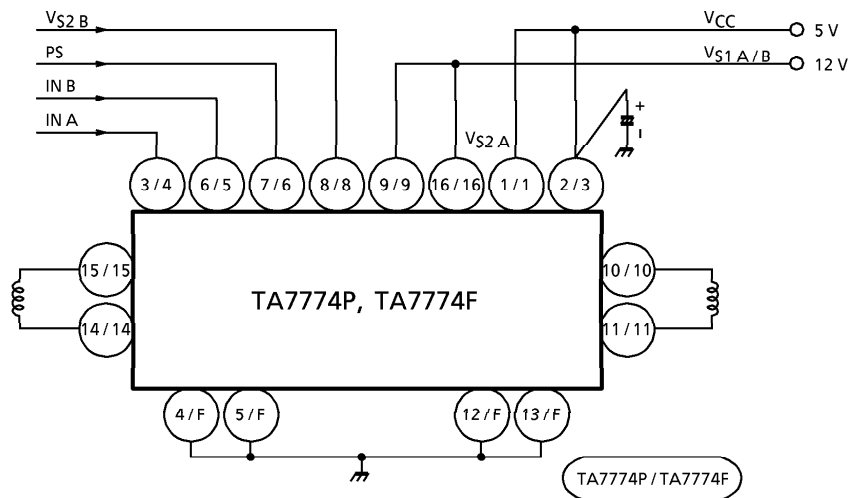
ITEM	SW ₁	SW ₂
V_{FU}	a	e
	b	
	c	
	d	
V_{FL}	e	a
		b
		c
		d

TIMING CHART (2 phase excitation)





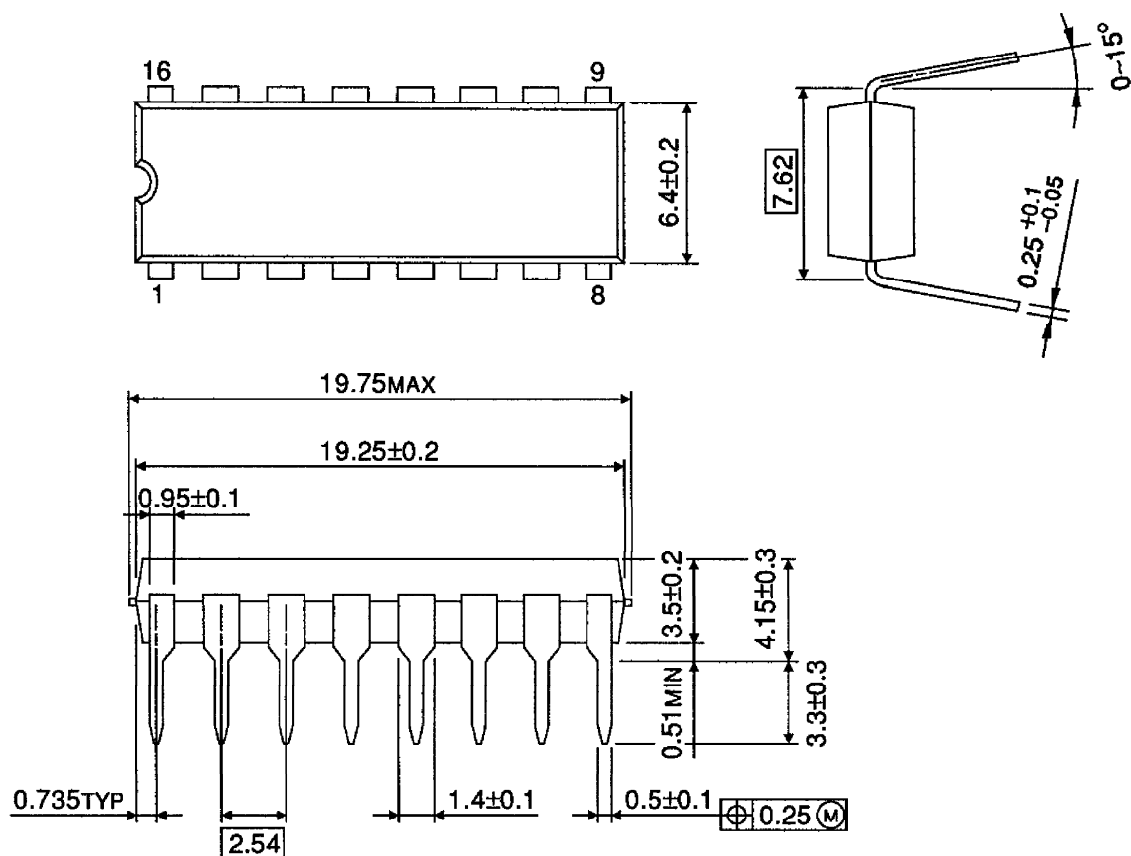
APPLICATION CIRCUIT



(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

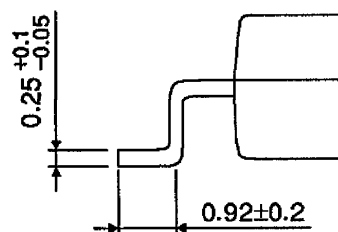
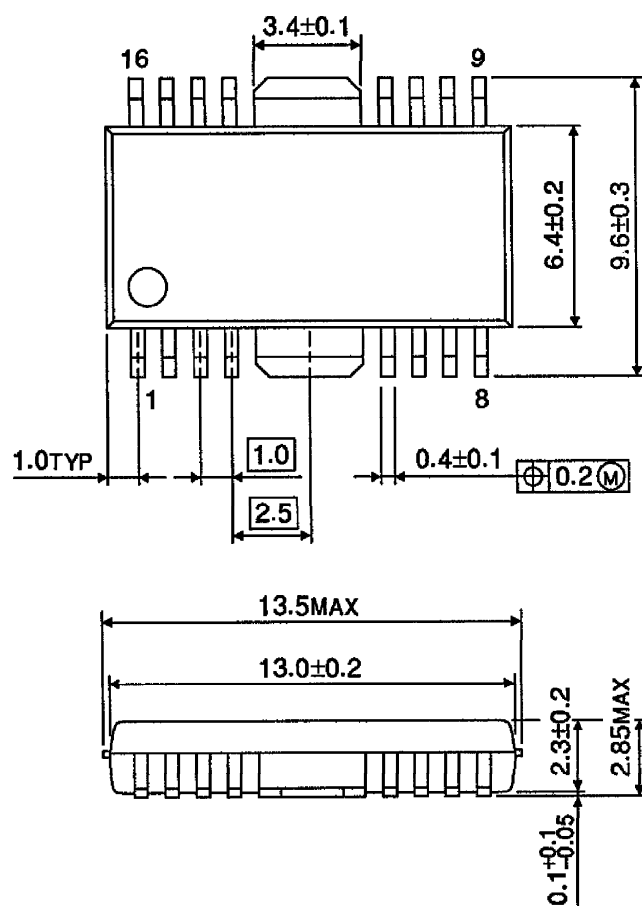
Unit : mm



Weight : 1.11 g (Typ.)

OUTLINE DRAWING
HSOP16-P-300-1.00

Unit : mm



Weight : 0.50 g (Typ.)