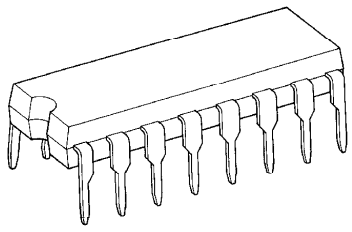
TOSHIBA BIPOLAR LINEAR INTEGRATED CIRCUIT SILICON MONOLITHIC

TA7774P, TA7774F

STEPPING MOTOR DRIVER IC

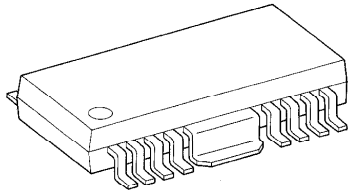
The TA7774P, TA7774F is 2 phase Bipolar stepping motor driver IC designed especially for 3.5 or 5.25 inches FDD head actuator drives.
It consists of TTL compatible input circuit, dual bridge driver outputs with flyback diodes, changing circuit of motor coil drive voltage (Power saving circuit) and stand-by circuit.

TA7774P



DIP16-P-300-2.54A

TA7774F



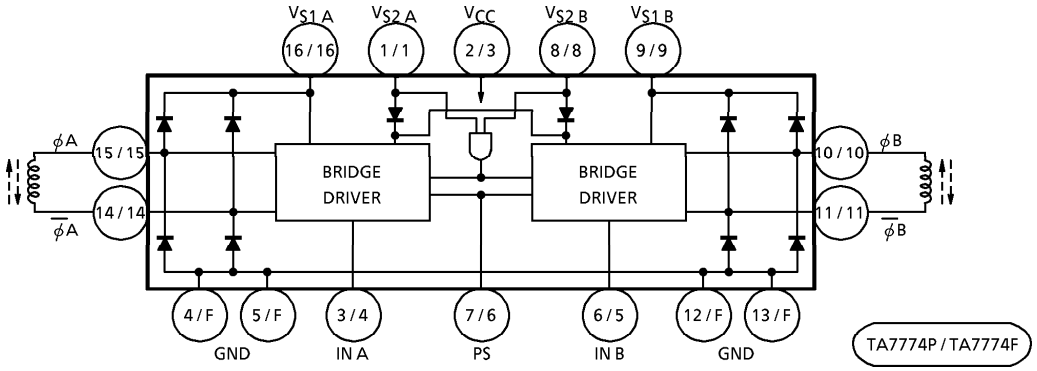
HSOP16-P-300-1.00

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

FEATURES

- One Chip 2 Phase Bipolar Stepping Motor Driver.
- Power Saving and Stand-by Operation are available.
  I stand-by (I_{CC3}) ≦ 115μA
- 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 0.4A (peak)

BLOCK DIAGRAM



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

PIN FUNCTION

PIN No.	SYMBOL	FUNCTIONAL DESCRIPTION
1 / (1)	$V_{S2\ A}$	Low-voltage power supply terminal, or stand-by signal input 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)	$V_{S2\ B}$	Low-voltage powersupply terminal, or stand-by signal input terminal
9 / (9)	$V_{S1\ B}$	High-voltage power supply terminal
10 / (10)	ϕB	Output B
11 / (11)	$\phi\overline{B}$	Output $\overline{B}$
12 / (F)	GND	GND terminal
13 / (F)	GND	GND terminal
14 / (14)	$\phi\overline{A}$	Output $\overline{A}$
15 / (15)	ϕA	Output A
16 / (16)	$V_{S1\ A}$	High-voltage power supply terminal.

( ) : TA7774F

TRUTH TABLE 1

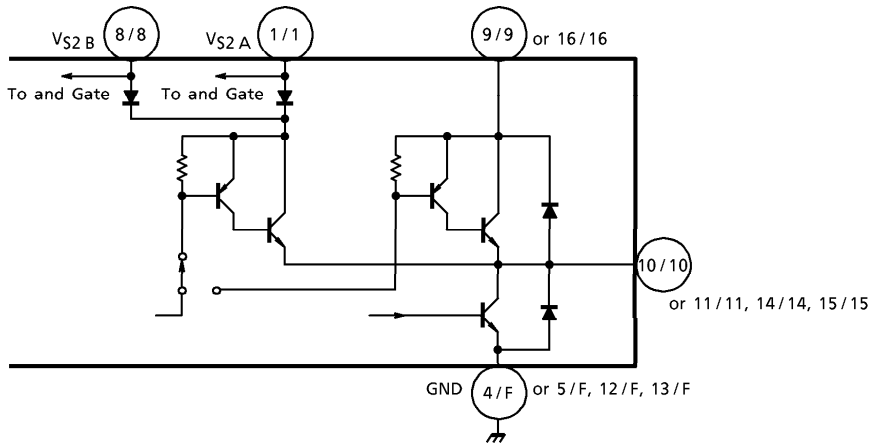
INPUT		OUTPUT		
PS	IN	ϕ	$\overline{\phi}$	
L	L	L	H	Enable V_{S1}
L	H	H	L	Enable V_{S1}
H	L	L	H	Enable V_{S2} (Power save)
H	H	H	L	Enable V_{S2} (Power save)

TRUTH TABLE 2

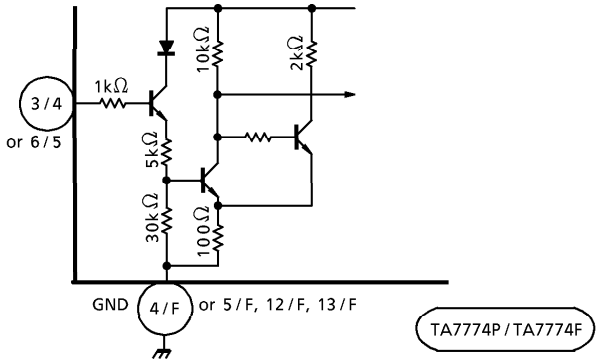
$V_{S2\ A}$	$V_{S2\ B}$	
L	(*)	Power Off (stand-by)
(*)	L	Power Off (stand-by)
H	H	Operation

(*) H or L

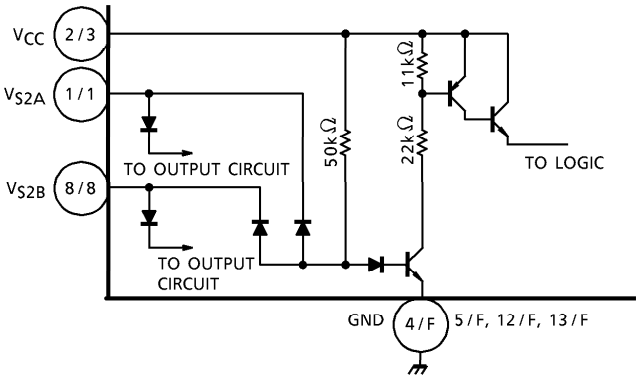
OUTPUT CIRCUIT



INPUT CIRCUIT IN A, IN B



INPUT CIRCUIT $V_{S2\,A}$ or $V_{S2\,B}$



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
			(Note 2) 2.7	
	TA7774F		(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 × 0.8mm PCB mounting occupied copper area in excess of 60%.
(Note 3) This value is obtained by 60 × 30 × 1.6mm PCB mounting occupied copper area in excess of 50%.

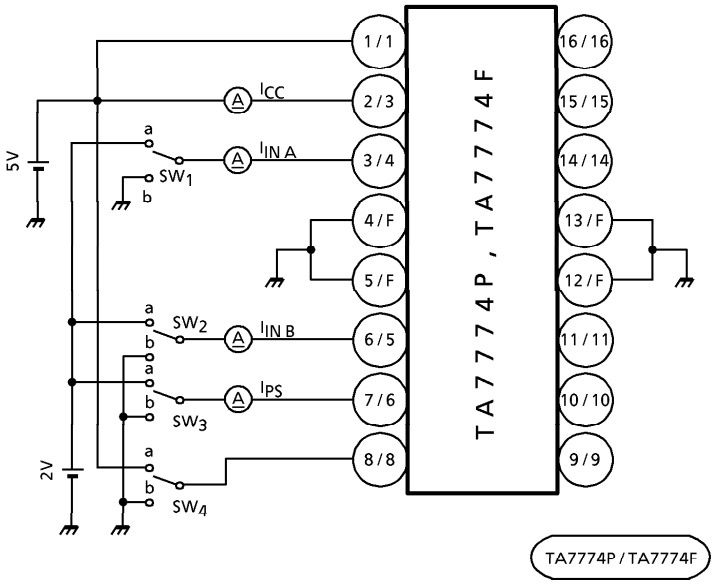
ELECTRICAL CHARACTERISTICS (Unless otherwise specified, Ta = 25°C, V_{CC} = 5V, V_{S1} = 12V, V_{S2} = 5V)

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	μA
Input Voltage	$V_{IN\,H}$	—	T_j = 25°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	
	$V_{VS2\,H}$		T_j = 25°C	Pin ⑧	3.5	—	V_{CC}	
	$V_{VS2\,L}$				GND	—	0.4	
Input Current	I_{IN}	1	T_j = 25°C, V_{S2} : H, V_{IN} / PS : Sink current	Pin ③, ⑥	—	2.6	30	μA
	I_{PS}			Pin ⑦	—	2.6	30	
Output Saturation Voltage	$V_{SAT\,1H1}$	2	PS : L, V_{S2} : H	I_{OUT} = 100mA	—	0.9	—	V
	$V_{SAT\,1H2}$			I_{OUT} = 400mA	—	1.2	1.5	
	$V_{SAT\,2H1}$	3	PS : H, V_{S2} : H	I_{OUT} = 20mA	—	1.6	—	
	$V_{SAT\,2H2}$			I_{OUT} = 100mA	—	1.8	2.1	
	$V_{SAT\,L1}$		V_{S2} : H	I_{OUT} = 20mA	—	0.03	—	
	$V_{SAT\,L2}$	2		I_{OUT} = 100mA	—	0.15	—	
	$V_{SAT\,L3}$			I_{OUT} = 400mA	—	0.35	0.6	
Diode Forward Voltage	$V_{F\,U}$	4	I_F = 350mA		—	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 $V_{S1\,(opr.)}$ 12V ± 10%
$V_{S2\,(opr.)}$ 5V ± 10%

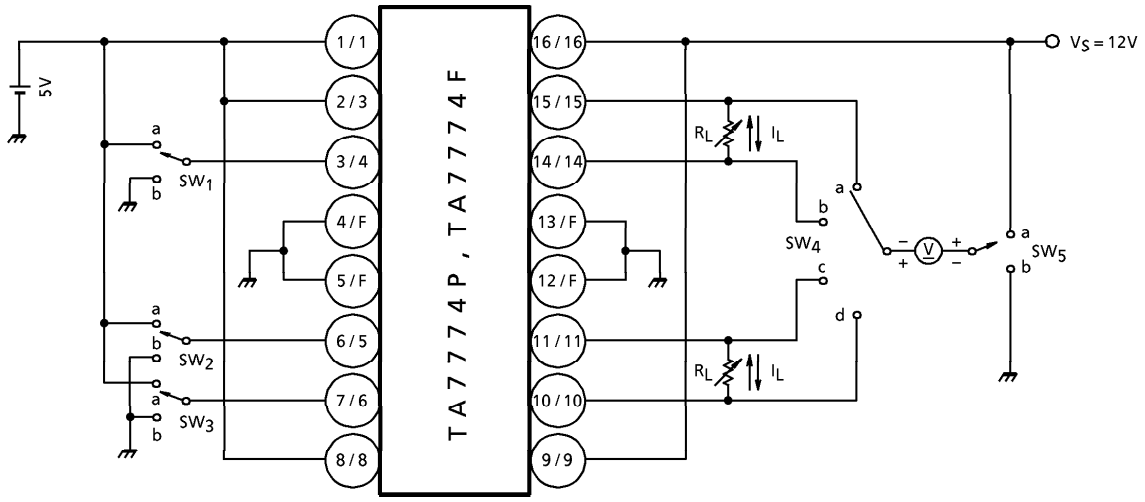
Operating Voltage Restriction $V_{S1} \geqq V_{S2}$

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

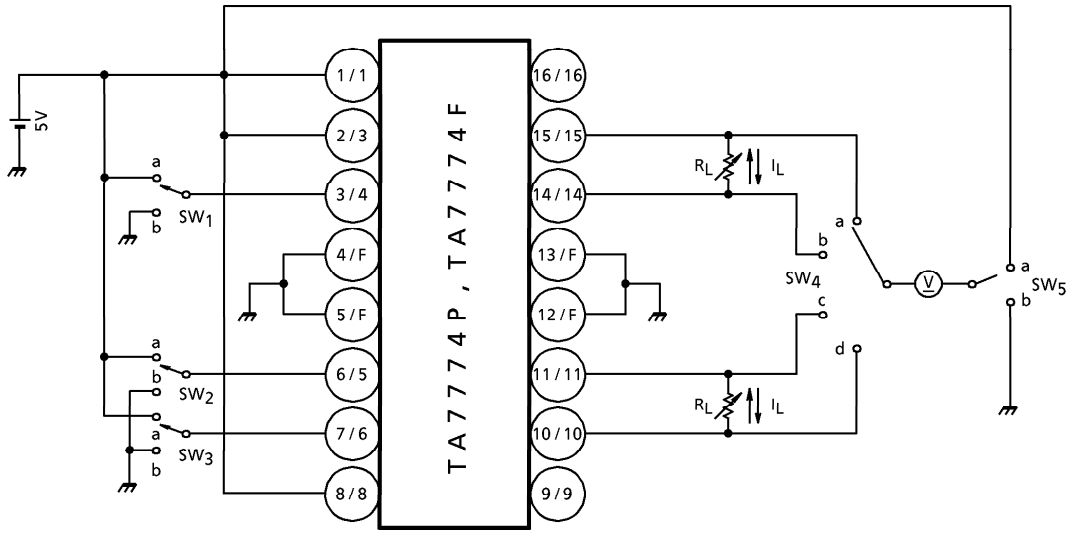
TEST CIRCUIT 2 $V_{SAT\ 1H1}$, $V_{SAT\ 1H2}$, $V_{SAT\ L2}$, $V_{SAT\ L3}$



(*) Calibrate I_L to 0.4/0.1A 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		

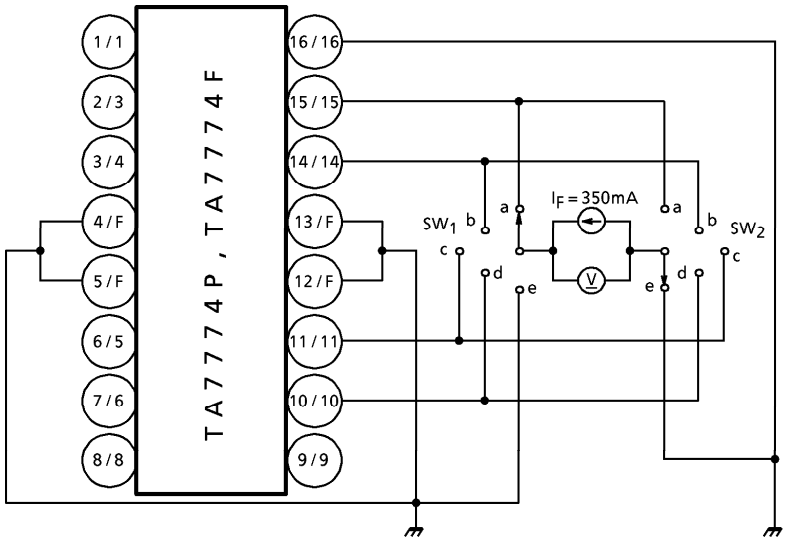
TEST CIRCUIT 3 $V_{SAT\ 2H1}$, $V_{SAT\ 2H2}$, $V_{SAT\ L1}$



(*) Calibrate I_L to 20 / 100mA 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		

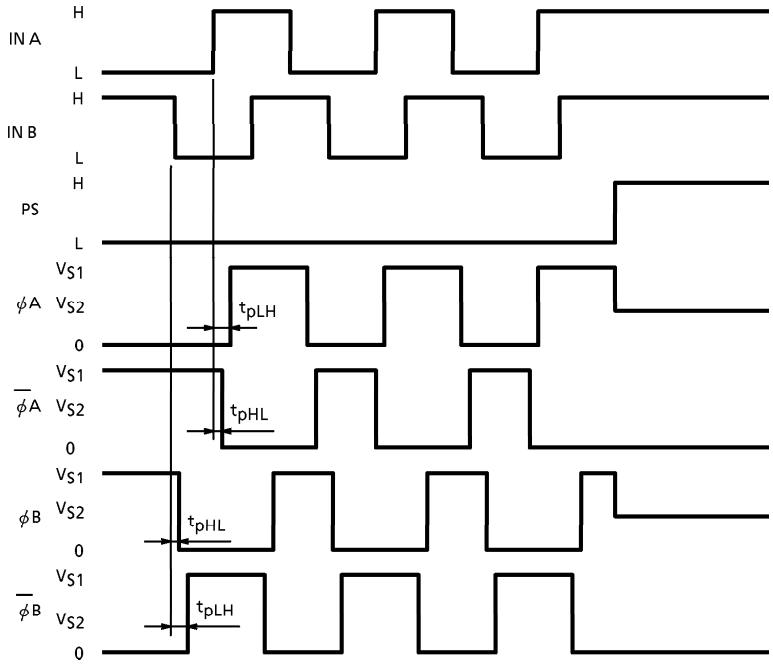
TEST CIRCUIT 4 V_{FU}, V_{FL}



MEASURING METHOD

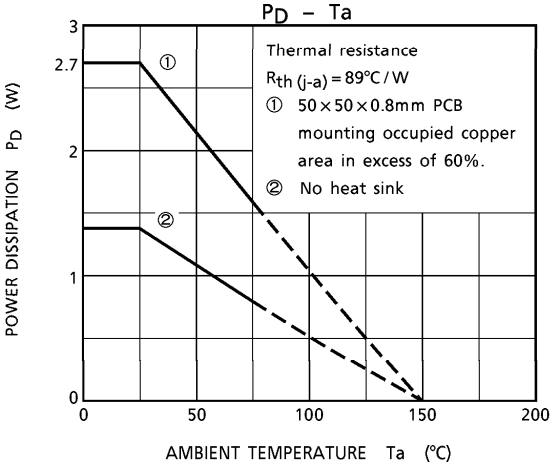
ITEM	SW_1	SW_2
V_{FU}	a	e
	b	
	c	
	d	
V_{FL}	e	a
		b
		c
		d

TIMING CHART (2 phase excitation)

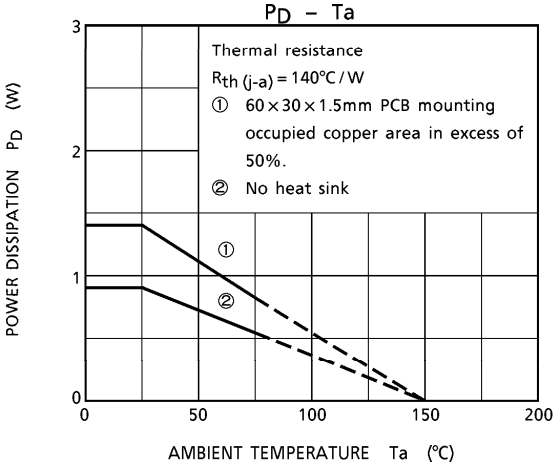


t_{pLH} : 7μs (Typ.)
t_{pLH} : 2μs (Typ.)

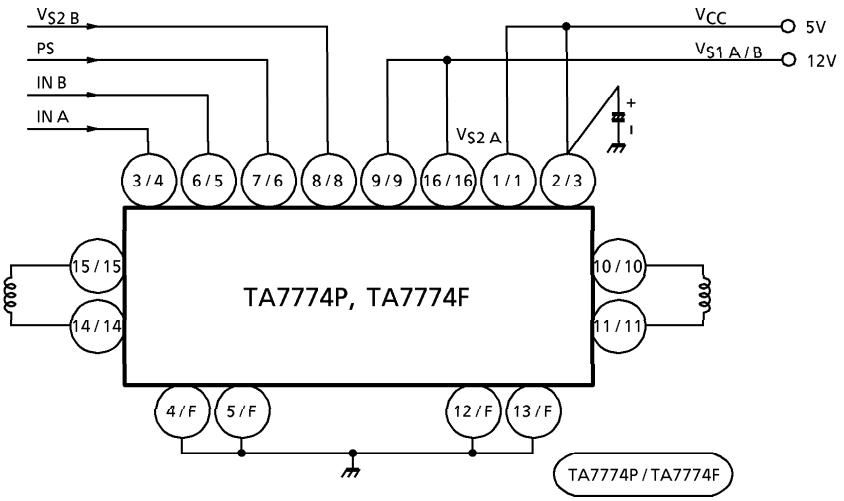
TA7774P



TA7774F



APPLICATION CIRCUIT

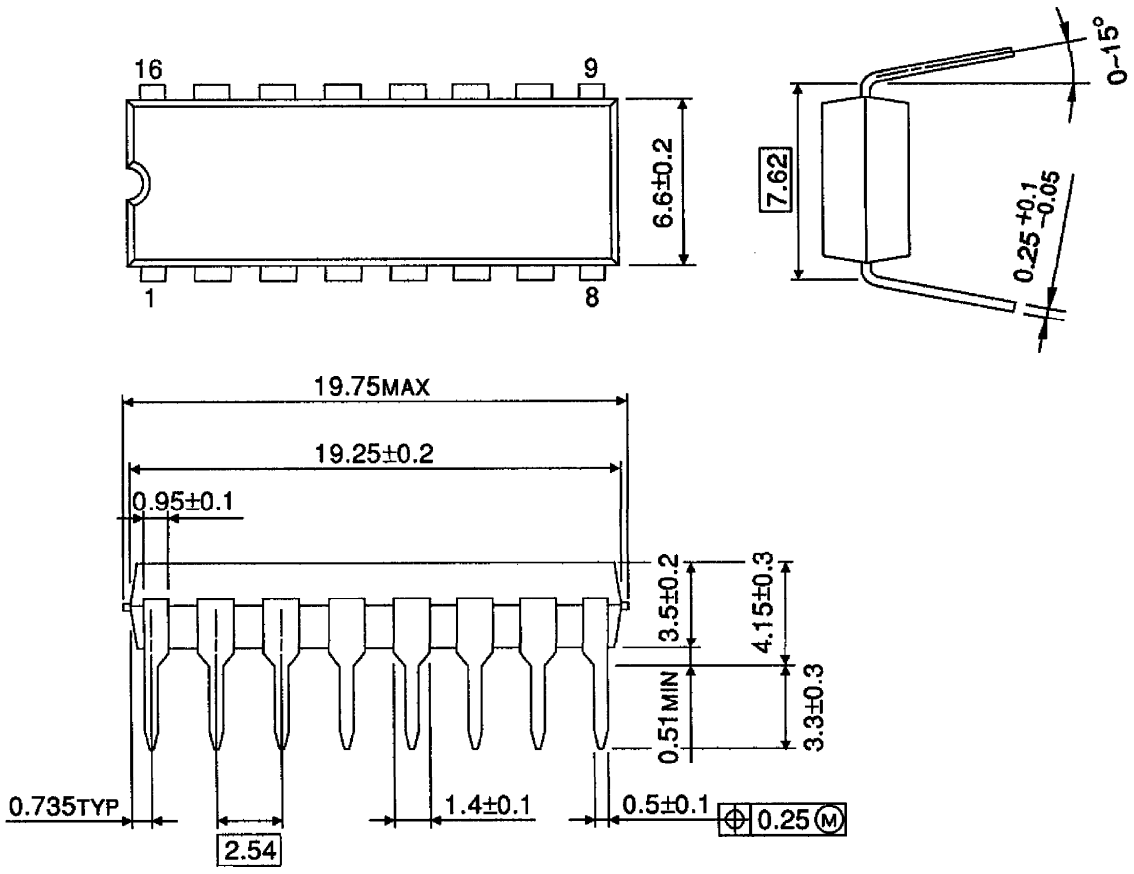


(Note) Utmost care is necessary in the design of the output line, V_S and GND line since IC may be destroyed due to short-circuit between outputs, air contamination fault, or fault by improper grounding.

OUTLINE DRAWING

DIP16-P-300-2.54A

Unit : mm

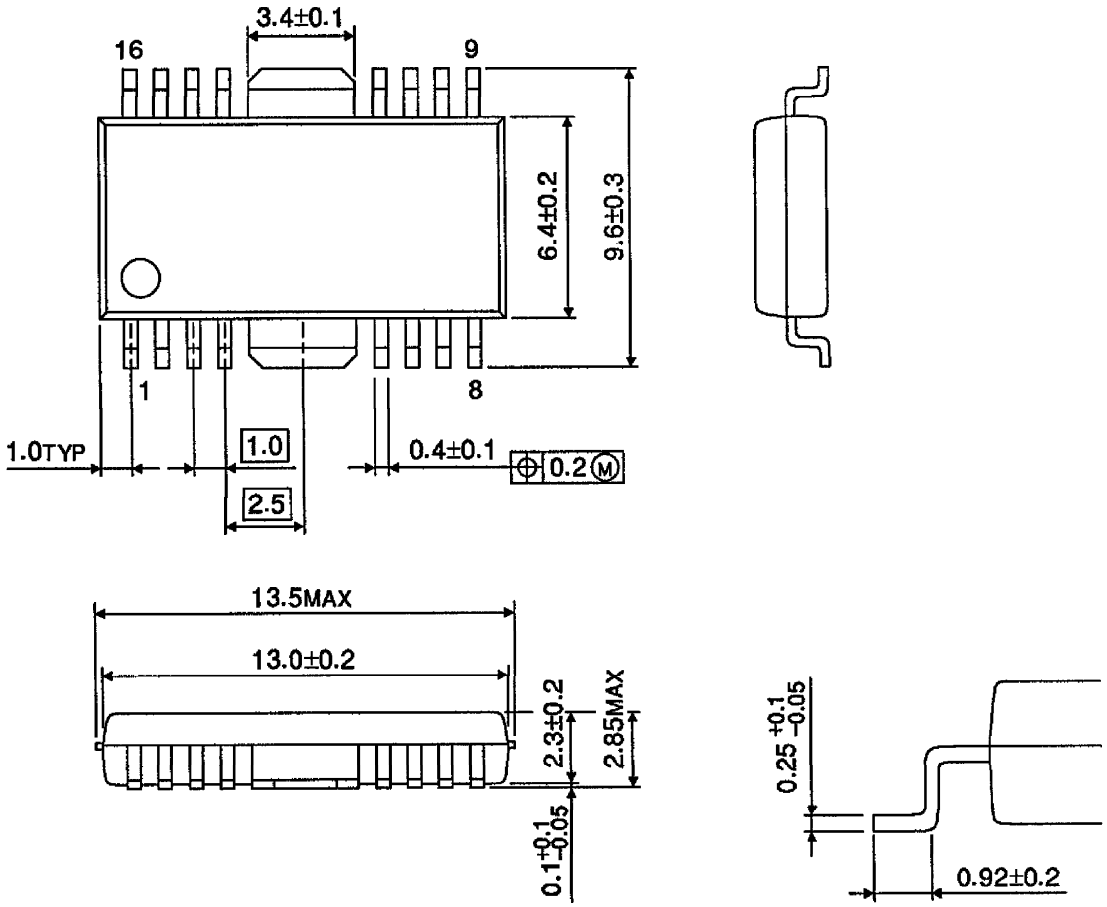


Weight : 1.11g (Typ.)

OUTLINE DRAWING

HSOP16-P-300-1.00

Unit : mm



Weight : 0.50g (Typ.)