

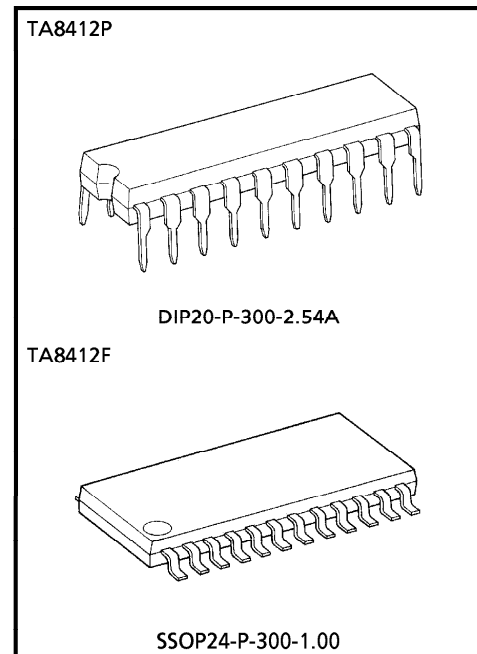
TOSHIBA BIPOLAR LINEAR INTEGRATED CIRCUIT SILICON MONOLITHIC

TA8412P, TA8412F

3-PHASE BI-DIRECTIONAL HALL MOTOR CONTROL IC

FEATURES

- FG is not required.
(System for obtaining rotation signal through position sensing)
- Start/stop, CW/CCW and brake function is provided.
- Gain of position sensing circuit is high, and hysteresis is provided.
- Rotation signal output is provided.
(Frequency signal of three times the position sensing output (hall element output) can be obtained.)
- External transistor type.



Weight
 DIP20-P-300-2.54A : 2.25g (Typ.)
 SSOP24-P-300-1.00 : 0.32g (Typ.)

961001EBA1

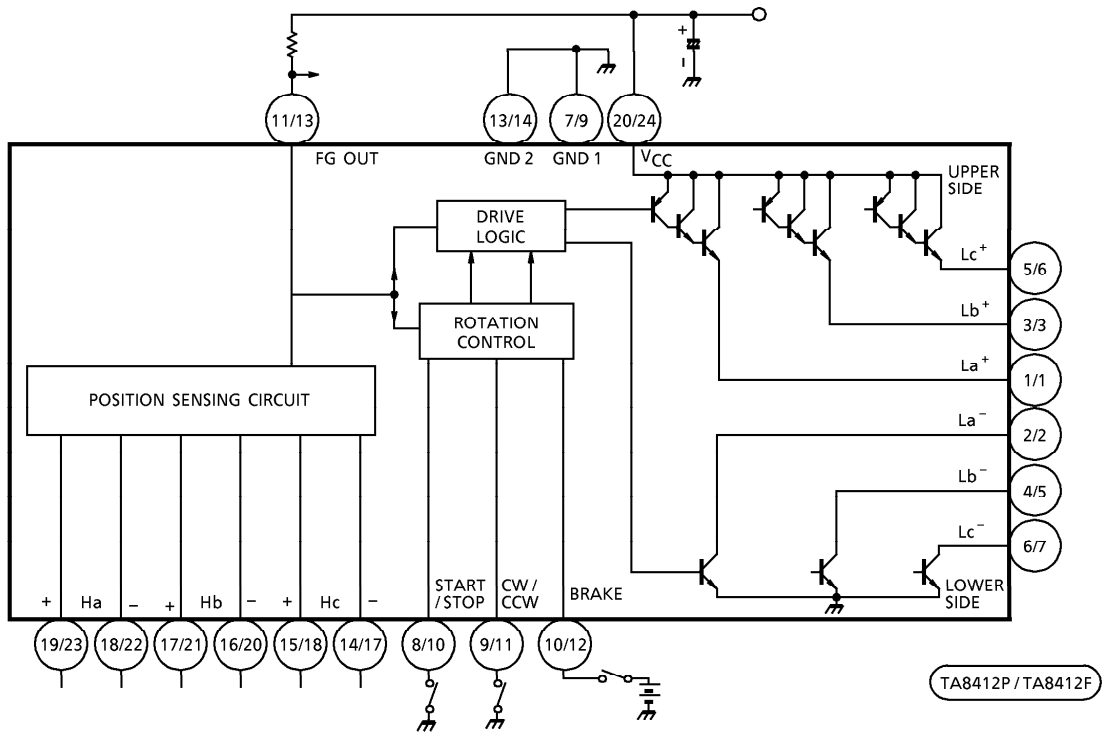
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BLOCK DIAGRAM



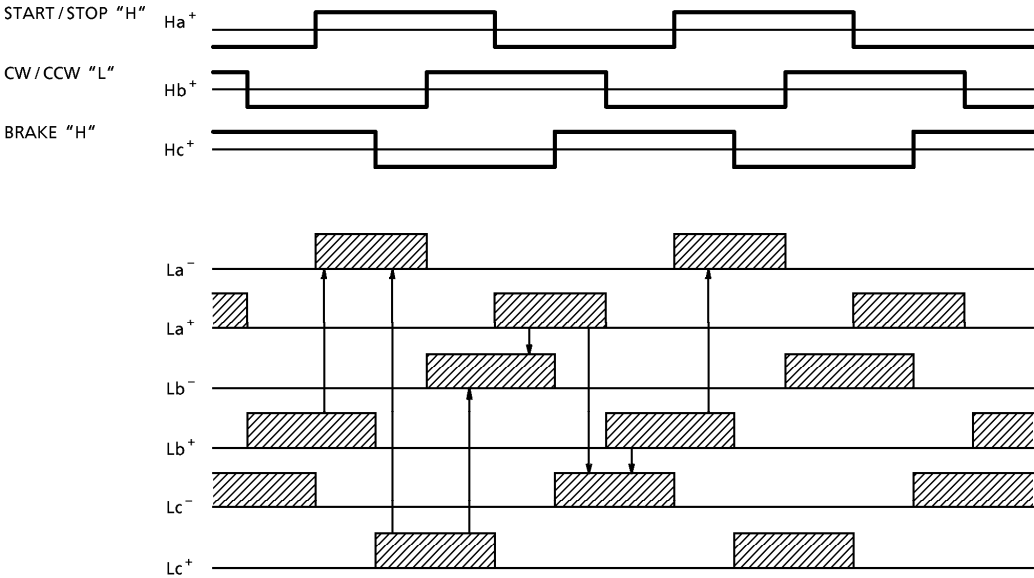
PIN FUNCTION

PIN No.		SYMBOL	FUNCTION DESCRIPTION
P	F		
1	1	La ⁺	a-phase upper drive output terminal.
2	2	La ⁻	a-phase lower drive output terminal.
3	3	Lb ⁺	b-phase upper drive output terminal.
4	5	Lb ⁻	b-phase lower drive output terminal.
5	6	Lc ⁺	c-phase upper drive output terminal.
6	7	Lc ⁻	c-phase lower drive output terminal.
7	9	GND1	GND1 terminal.
8	10	START/STOP	Start/Stop control terminal.
9	11	CW/CCW	Forward/reverse rotation control terminal.
10	12	BRAKE	Brake terminal.
11	13	FG OUT	FG signal output terminal.
12	—	N. C.	No connection.
13	14	GND2	GND2 terminal.
14	17	Hc ⁻	c-phase Hall Amp. negative input terminal.
15	18	Hc ⁺	c-phase Hall Amp. positive input terminal.
16	20	Hb ⁻	b-phase Hall Amp. negative input terminal.
17	21	Hb ⁺	b-phase Hall Amp. positive input terminal.
18	22	Ha ⁻	a-phase Hall Amp. negative input terminal.
19	23	Ha ⁺	a-phase Hall Amp. positive input terminal.
20	24	VCC	Power supply input terminal.

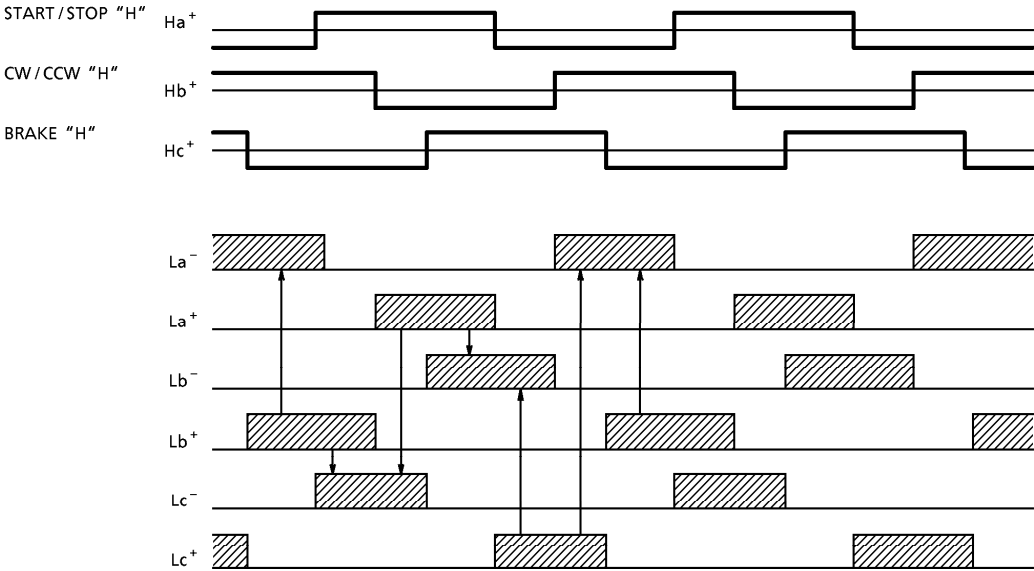
F type : Pin④, ⑧, ⑮, ⑯, ⑲ No connection.

TIMING CHART

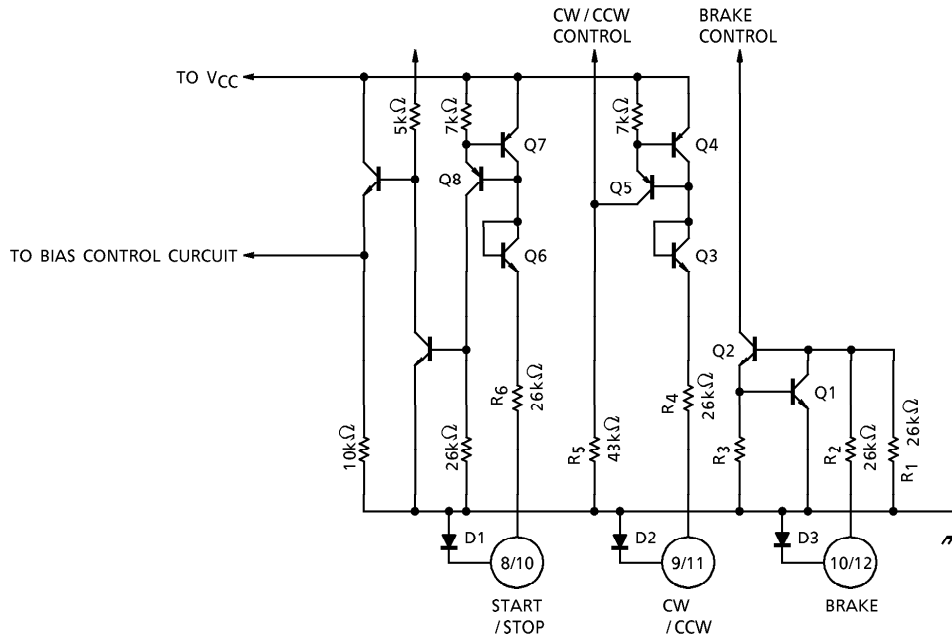
Forward rotation (Position sensing signal advances Ha→Hb→Hc.)



Reverse rotation (Position sensing signal advances Ha→Hc→Hb.)



(1) Control input circuit



START/STOP and CW/CCW inputs are Low Active and BRAKE input is high Active typ. D1~D3 are input protect diodes.

Input current of START/STOP and CW/CCW are calculated by following equations.

$$I_{IN C} = \frac{V_{CC} - V_{INC} - V_{BEQ3} - V_{BEQ4} - V_{BEQ5}}{R_4} \approx \frac{V_{CC} - V_{INC} - 2.1}{26 \times 10^3} \quad (A)$$

(Pin 9/11)

$$I_{IN R} = \frac{V_{CC} - V_{INR} - V_{BEQ6} - V_{BEQ7} - V_{BEQ8}}{R_6} \approx \frac{V_{CC} - V_{INR} - 2.1}{26 \times 10^3} \quad (A)$$

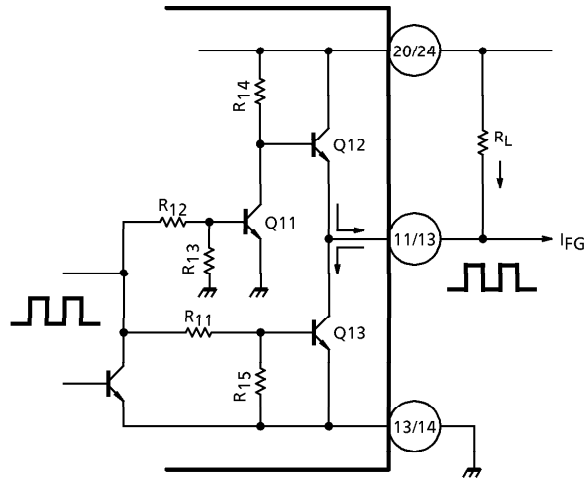
(Pin 8/10)

And also input current of BRAKE (Pin 10/12) is calculated by following equation.

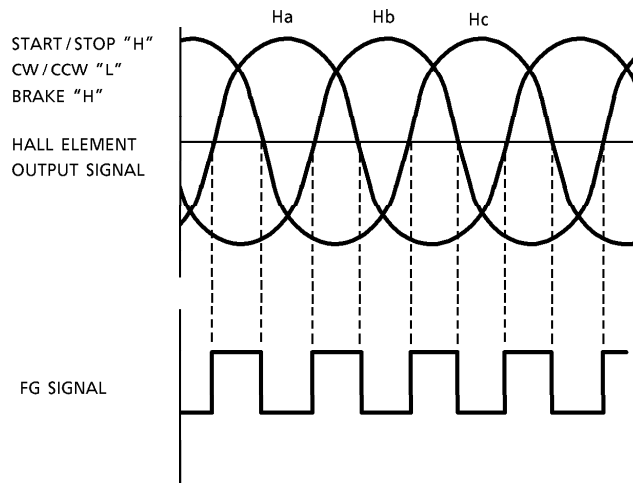
$$I_{IN B} = \frac{V_{INB} - V_{BEQ2} - V_{BEQ3}}{R_2} \approx \frac{V_{INB} - 1.4}{26 \times 10^3} \quad (A)$$

(Pin 10/12)

(2) FG output circuit



FG signal is generated by the using 3 phase hall signals.
 FG output transistors of Q12 and Q13 work push-pull.
 Specified output voltage generates if load resistor connect to FG output to V_{CC} .



MAXIMUM RATINGS (Ta = 25°C)

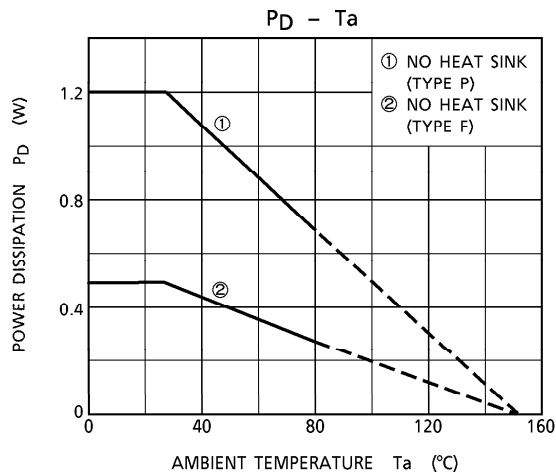
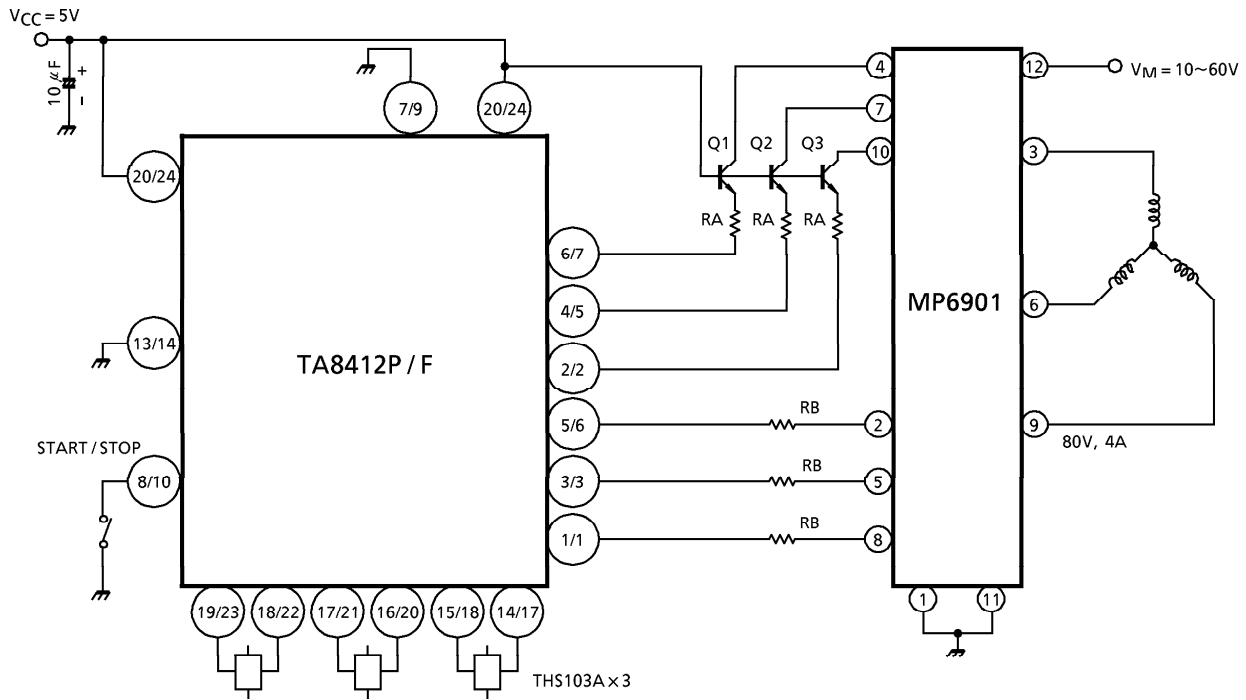
CHARACTERISTIC	SYMBOL	RATING	UNIT
Power Supply Voltage	V _{CC}	18	V
Output Current	I _O	± 100	mA
Position Sensing Circuit Input Voltage (T _j = 25°C)	V _H	400	mV _{p-p}
Power Dissipation	P _D (Note)	1.2	W
		0.5	
Operating Temperature	T _{opr}	- 30~75	°C
Storage Temperature	T _{stg}	- 55~150	°C

(Note) No heat sink

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

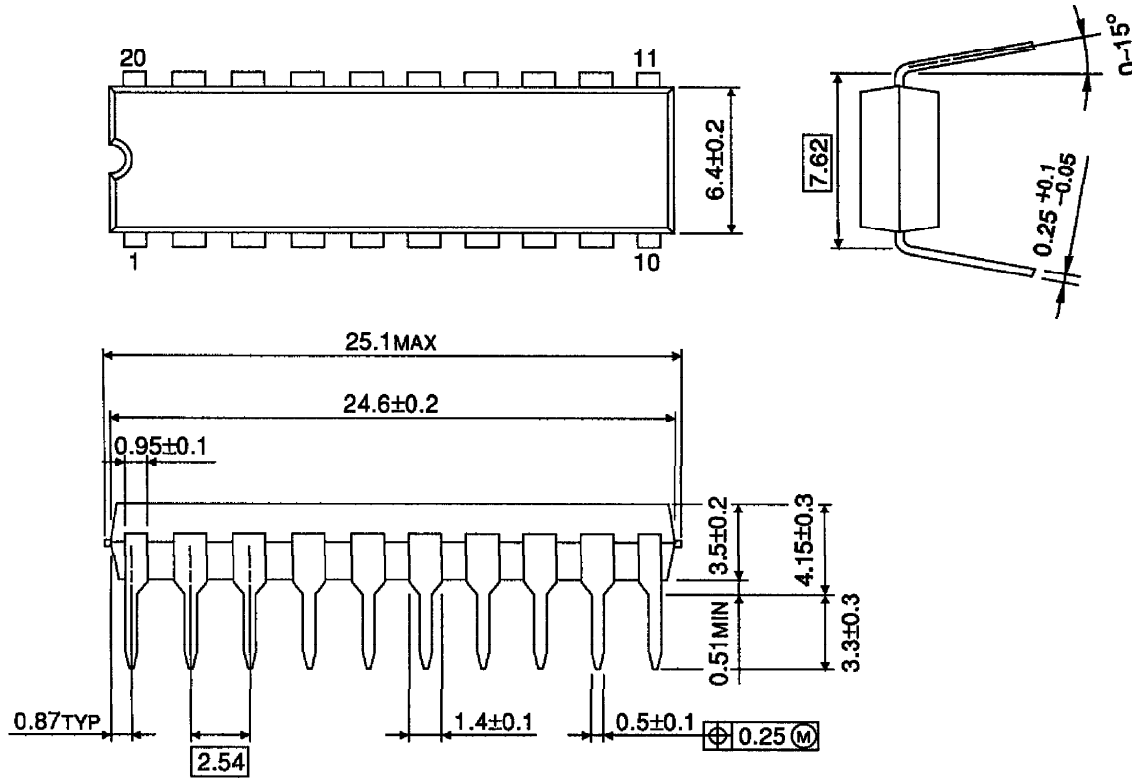
CHARACTERISTIC	SYMBOL	TEST CIR-CUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Operation Power Supply Voltage	V _{CC (opr)}	—		4.0	—	18	V
Power Supply Current	I _{CC1}	—	Stop state	—	4	—	mA
	I _{CC2}		Output open	—	4	—	
Saturation Voltage	V _{SAT (U-1)}	—	I _O = 10mA	—	1.5	—	V
	V _{SAT (U-2)}		I _O = 100mA	—	2.0	—	
	V _{SAT (L-1)}		I _O = 10mA	—	0.4	—	
	V _{SAT (L-2)}		I _O = 100mA	—	0.5	1.0	
Leak Current	I _{L (U)}	—	V = 18V	—	—	100	μA
	I _{L (L)}			—	—	100	
Position Sensing Input	CMRH	—		2.0	—	V _{CC} - 0.5	V
	V _H			20	—	—	mV _{p-p}
	V _{H - Hys}			2	7	15	mV
START Input (Low Act)	V _{IN R (H)}	—		V _{CC} - 0.9	—	V _{CC}	V
	V _{IN R (L)}	—		—	—	1.0	
	I _{IN R}	—	V _{IN R} = 1.0V	—	70	200	μA
CW / CCW Input (Low Act)	V _{IN C (H)}	—		V _{CC} - 0.9	—	V _{CC}	V
	V _{IN C (L)}			—	—	1.0	
	I _{IN C}			V _{IN C} = 1.0V	—	70	200
BRAKE Input (High Act)	V _{IN B (H)}	—		4.0	—	V _{CC}	V
	V _{IN B (L)}			—	—	1.0	
	I _{IN B}			V _{IN B} = 4V	—	100	250
FG Output	V _{FGH}	—	I _{FG} = 1.0mA	V _{CC} - 1.0	—	—	V
	V _{FG L}			—	—	0.5	

APPLICATION CIRCUIT



OUTLINE DRAWING
DIP20-P-300-2.54A

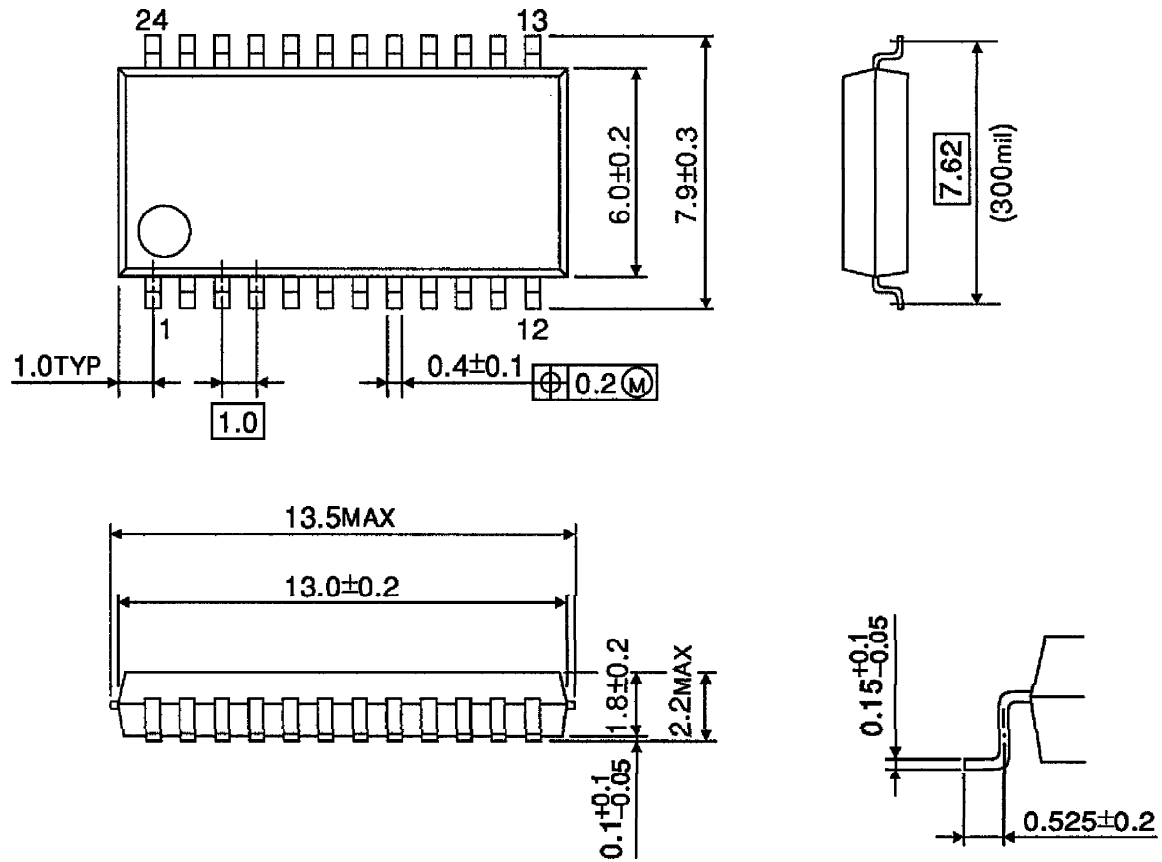
Unit : mm



Weight : 2.25g (Typ.)

OUTLINE DRAWING
SSOP24-P-300-1.00

Unit : mm



Weight : 0.32g (Typ.)