TOSHIBA BIPOLAR LINEAR INTEGRATED CIRCUIT SILICON MONOLITHIC

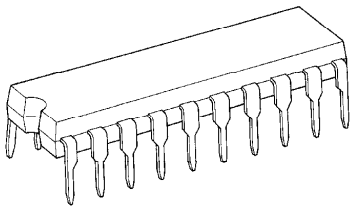
TA8412P, TA8412F

3-PHASE BI-DIRECTIONAL HALL MOTOR CONTROL IC

FEATURES

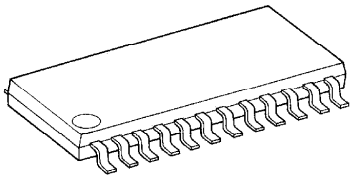
- FG is not required.
  (System for obtaining rotation signal through position sensing)
- Start / stop, CW / CCW and brake function is provided.
- Gain of position sensing circuit is high, and hysteresis is provided.
- Rotation signal output is provided.
  (Frequency signal of three times the position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

TA8412P



DIP20-P-300-2.54A

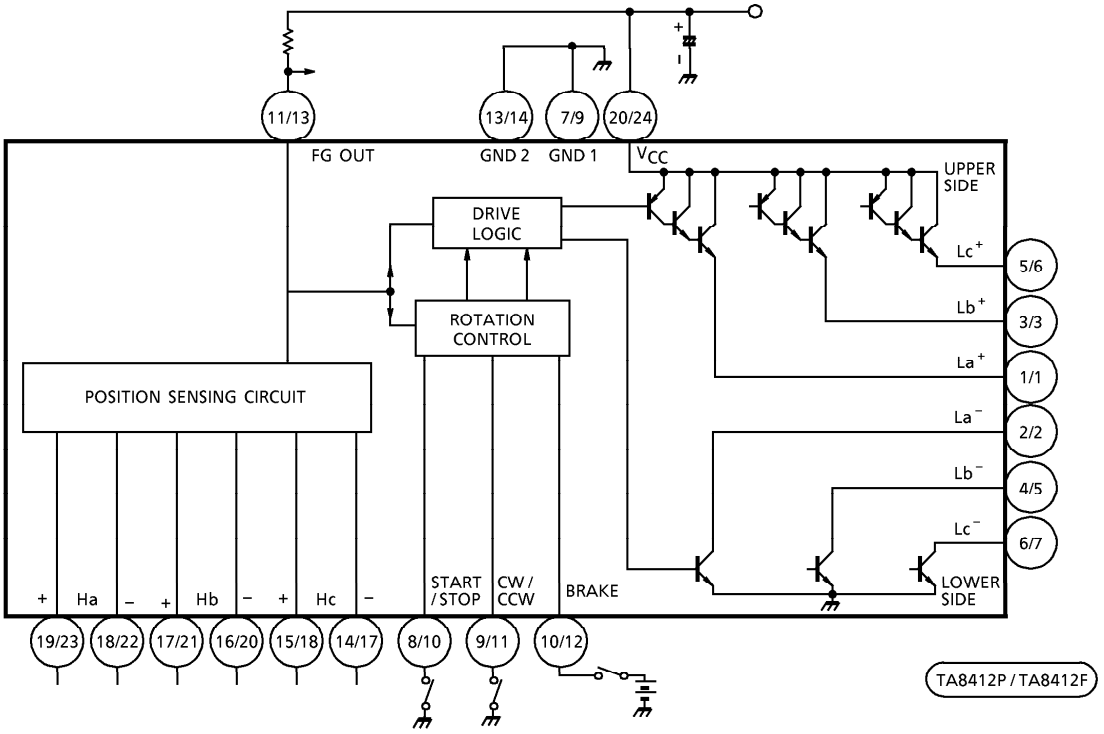
TA8412F



SSOP24-P-300-1.00

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

BLOCK DIAGRAM



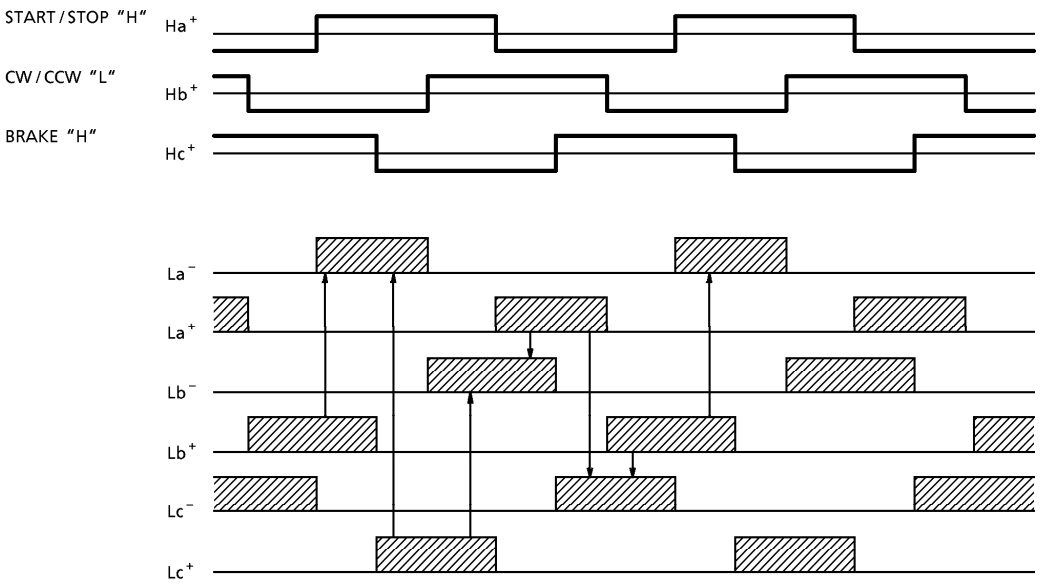
PIN FUNCTION

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	V_{CC}	Power supply input terminal.

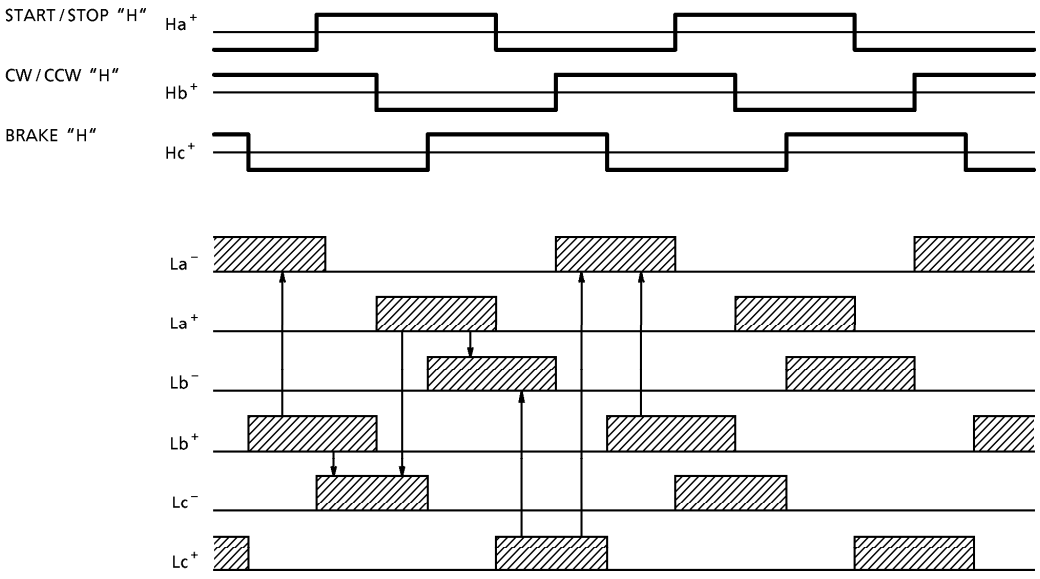
F type : Pin④, ⑧, ⑮, ⑯, ⑲ No connection.

TIMING CHART

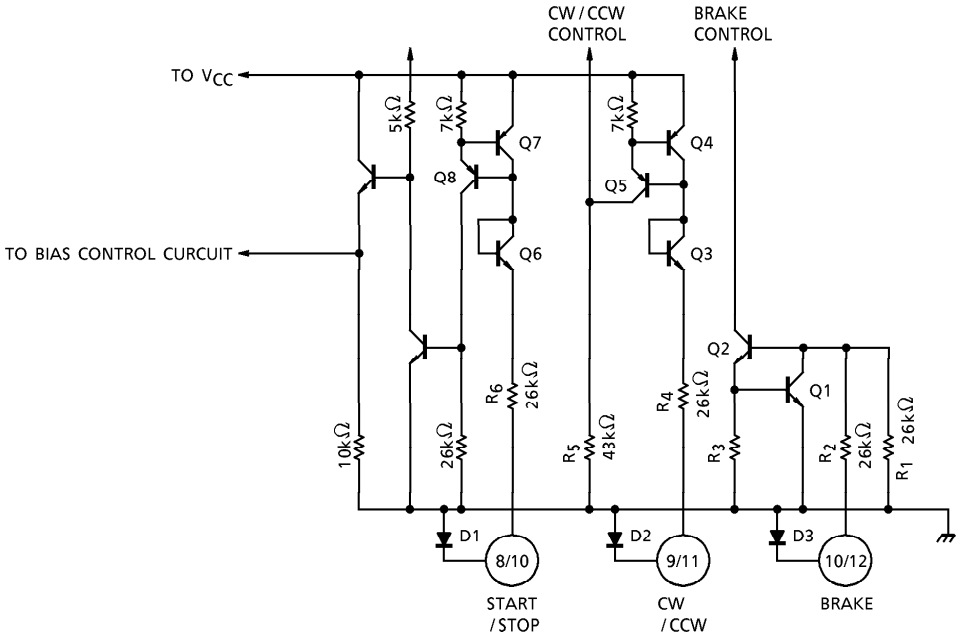
Forward rotation (Position sensing signal advances Ha→Hb→Hc.)



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.

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

(Pin (9/11))

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

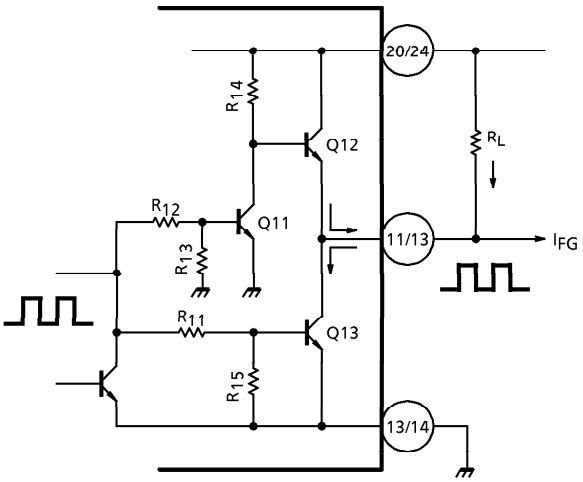
(Pin (8/10))

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

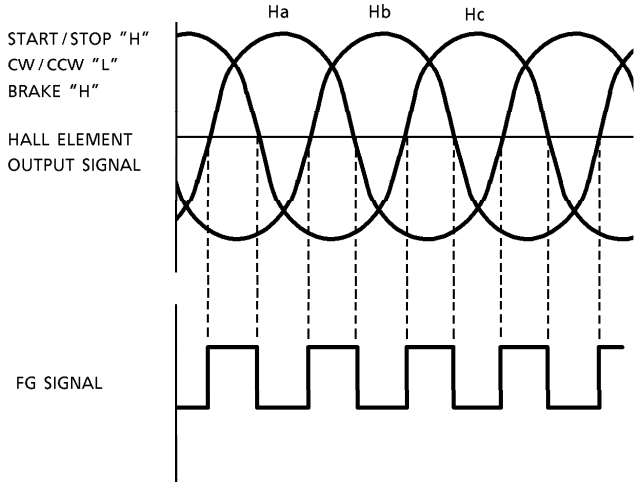
$$I_{IN\ B} = \frac{V_{INB} - V_{BEQ2} - V_{BEQ3}}{R_2} \fallingdotseq \frac{V_{INB} - 1.4}{26 \times 10^3} \quad (A)$$

(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)

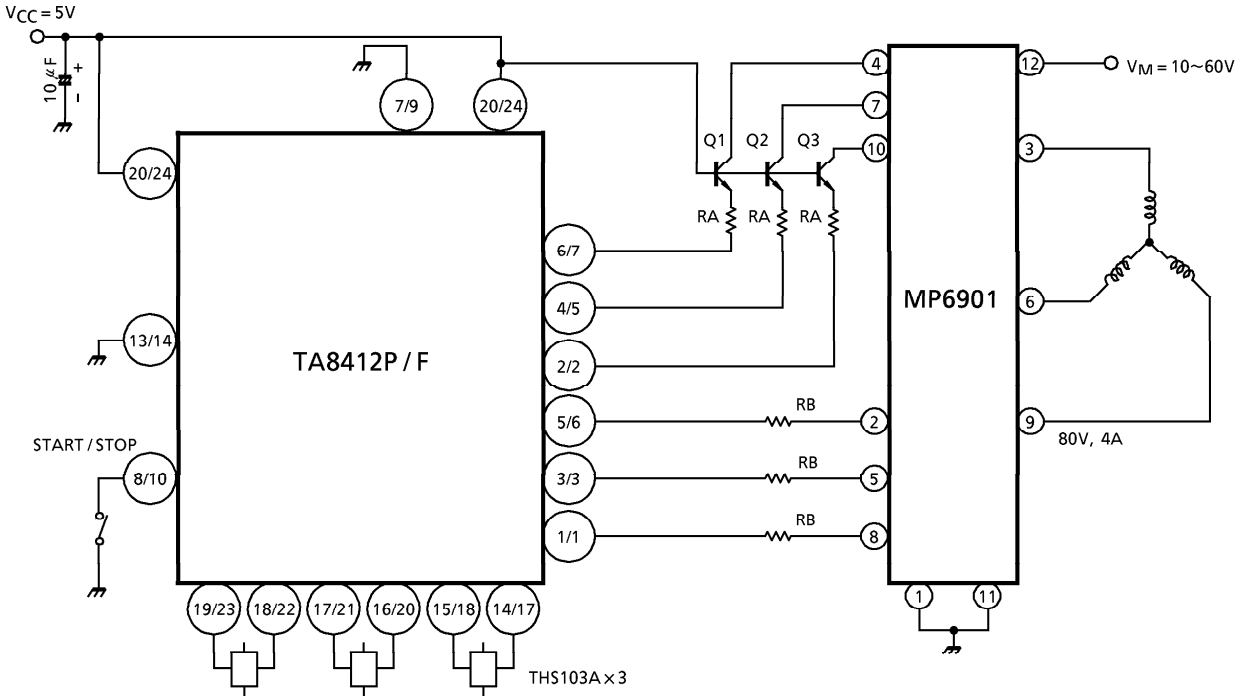
CHARACTERISTIC	SYMBOL	RATING	UNIT
Power Supply Voltage	V_{CC}	18	V
Output Current	I_O	± 100	mA
Position Sensing Circuit Input Voltage (T_j = 25°C)	V_H	400	mV_{p-p}
Power Dissipation	P_D (Note)	1.2	W
		0.5	
Operating Temperature	T_{opr}	− 30~75	°C
Storage Temperature	T_{stg}	− 55~150	°C

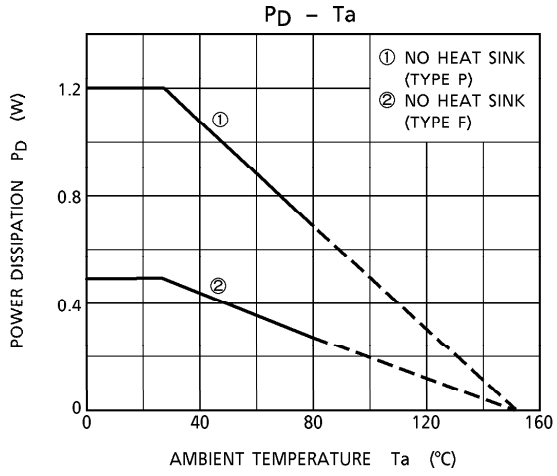
(Note) No heat sink

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	CMR_H	—		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	μA
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	μA
FG Output	V_{FGH}	—	I_{FG} = 1.0mA	V_{CC} − 1.0	—	—	V
	V_{FGL}			—	—	0.5	

APPLICATION CIRCUIT

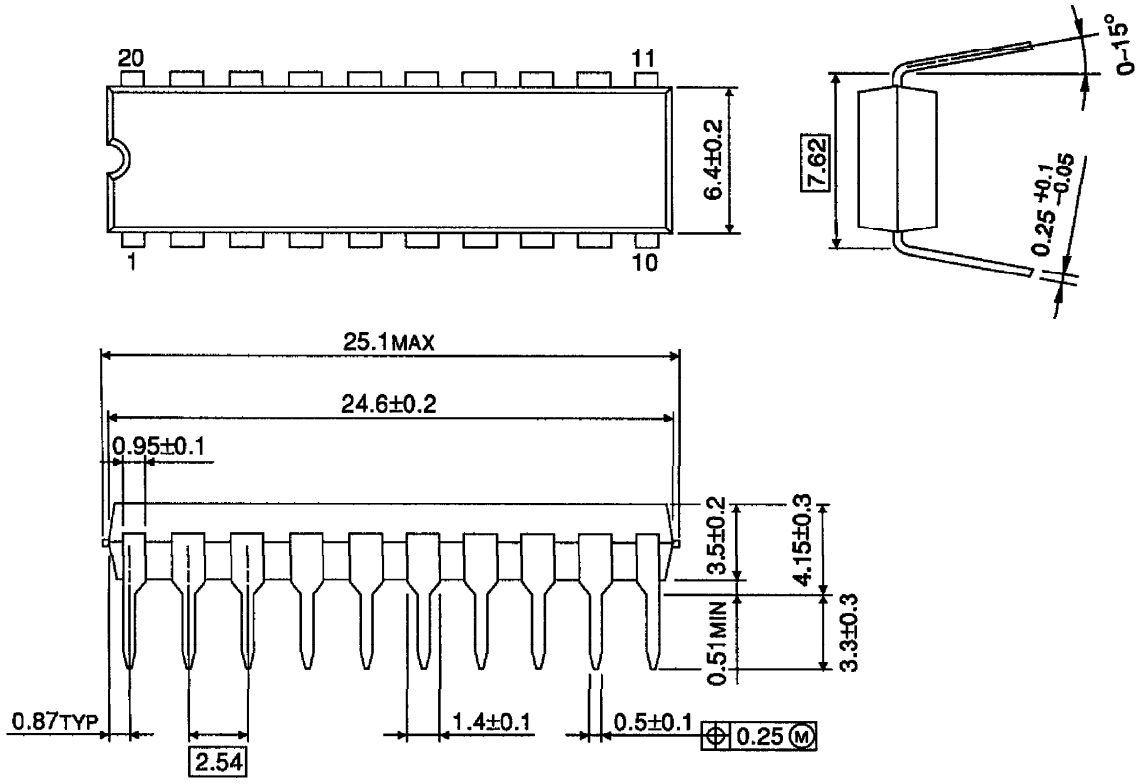




OUTLINE DRAWING

DIP20-P-300-2.54A

Unit : mm

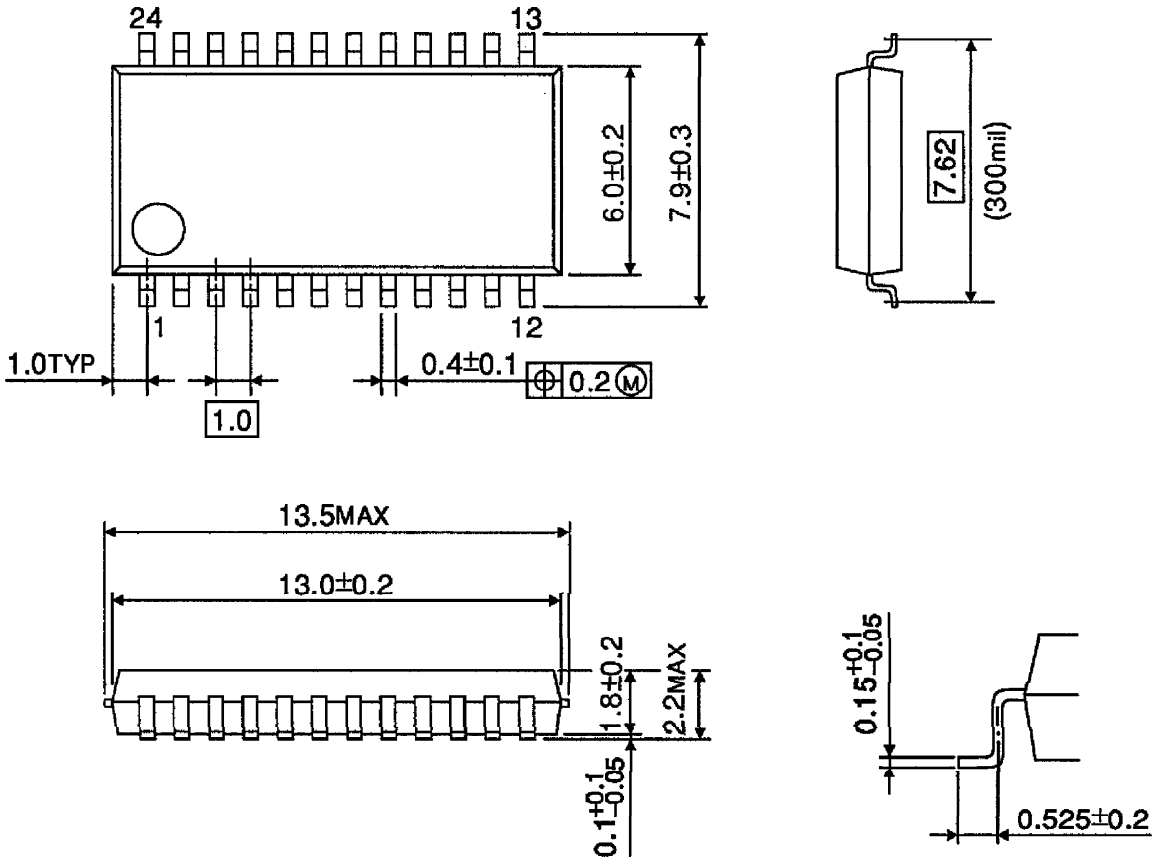


Weight : 2.25g (Typ.)

OUTLINE DRAWING

SSOP24-P-300-1.00

Unit : mm



Weight : 0.32g (Typ.)