

TOSHIBA BIPOLAR LINEAR INTEGRATED CIRCUIT SILICON MONOLITHIC

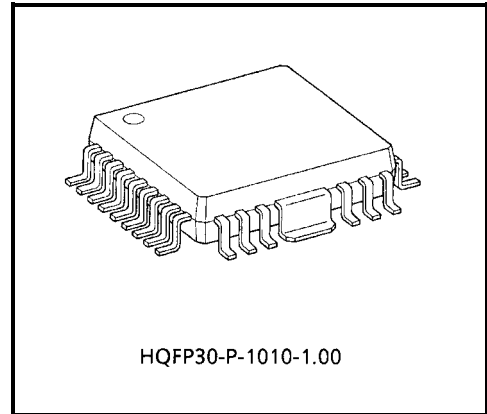
TA8463F

SINGLE CHIP 3 PHASE MOTOR DRIVER FOR FDD SPINDLE MOTOR.

The TA8463F is Single Chip Motor Driver IC for FDD Spindle Motor.

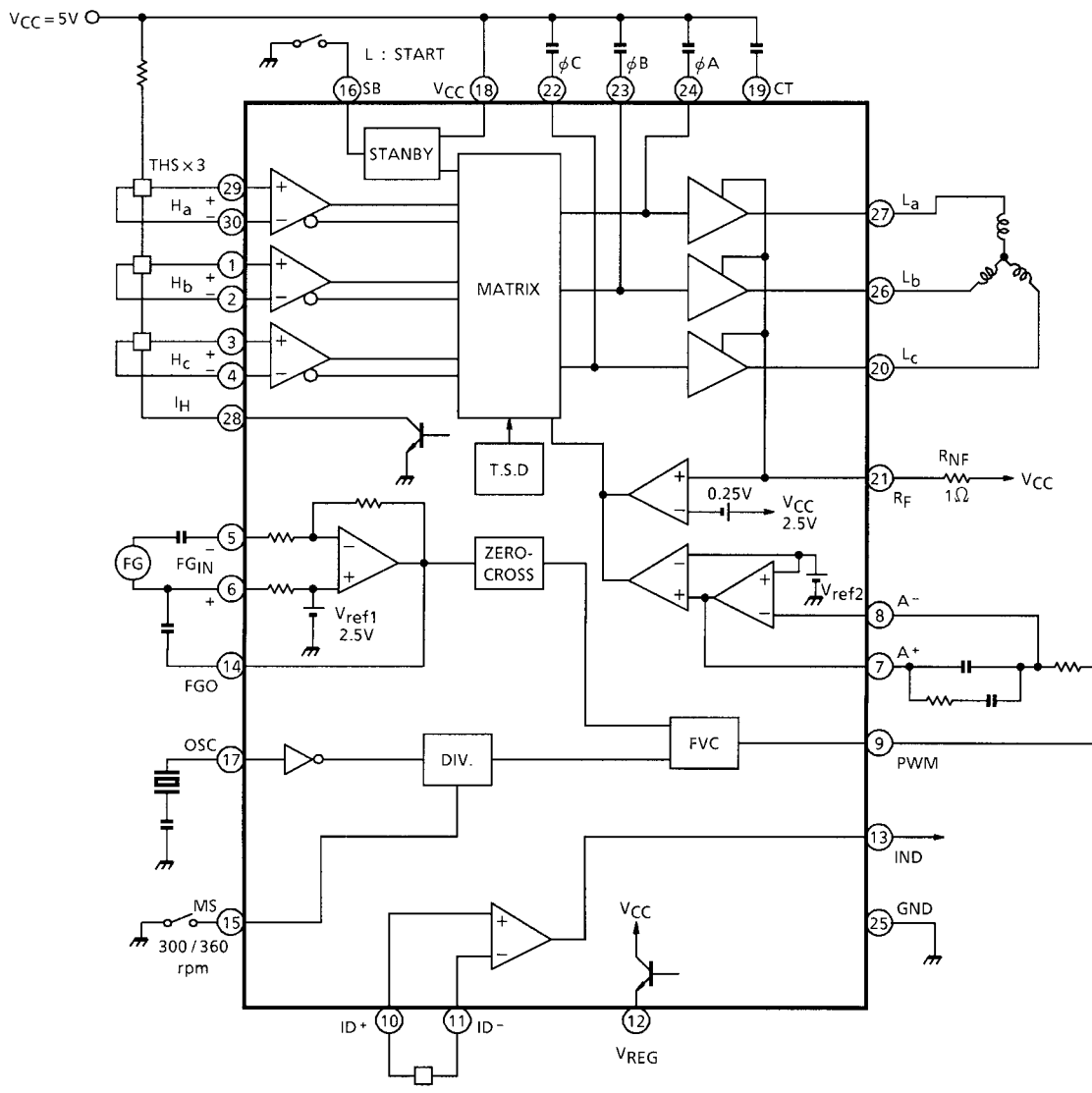
FEATURES

- 1 Chip motor driver with 3 phase semi-linear driving.
- Adjustment free with digital servo system.
- 300, 360 rpm are obtained.
- Built-in index pulse output current.
- Operating supply voltage range : $V_{CC} = 4.2\sim 7V$
- Output current : $I_O (MAX.) = 0.5 A (AVE.)$
- Built-in thermal shutdown circuit.
- Built-in over current protection circuit.
- Built-in stand-by circuit.



Weight : 0.61 g (Typ.)

BLOCK DIAGRAM



PIN FUNCTION

PIN No.	SYMBOL	FUNCTIONAL DESCRIPTION	EQUIVALENT CIRCUIT
29 30 1 2 3 4	H_a^+ H_a^- H_b^+ H_b^- H_c^+ H_c^-	<ul style="list-style-type: none"> Hall Amp. + / - Input Terminal. <p>The Hall Input Range is ; $V_H = 50\sim 300$ [mV_{p-p}] CMR = $1.3\sim(V_{CC}-0.9)$ [V]</p>	
28	I_H	<ul style="list-style-type: none"> Hall Bias Negative Side Connecting Terminal. <p>Open collector output.</p>	
5 6 14	FG_{IN}^- FG_{IN}^+ FGO	<ul style="list-style-type: none"> FG Amp. Negative Input Terminal. FG Amp. Positive Input Terminal. FG Amp. Output Terminal. <p>High Sensitivity of FG Amp. ; $V_{HFG} = 2.5$ mV</p>	
7 8	A^+ A^-	<ul style="list-style-type: none"> Error Amp. Output Terminal. Error Amp. Input Terminal. <p>External Ports Value (C.R) is determined by matching between Motor and IC.</p>	
9	PWM	<ul style="list-style-type: none"> F / V Converter Output Terminal <p>Reference : No.7 and No.8</p>	

PIN No.	SYMBOL	FUNCTIONAL DESCRIPTION	EQUIVALENT CIRCUIT
10 11	ID ⁺ ID ⁻	<ul style="list-style-type: none"> ● Index Positive Input Terminal. ● Index Negative Input Terminal. 	
13	IND	<ul style="list-style-type: none"> ● Index Amp. Output Terminal. <p>Reference : No.10 and No.11</p>	
15	MS	<ul style="list-style-type: none"> ● Mode Select Terminal. <p>300 rpm: L 360 rpm: H</p>	
16	SB	<ul style="list-style-type: none"> ● Stand-by Terminal. <p>SB: H ST: L</p>	
17	OSC	<ul style="list-style-type: none"> ● Oscillation Terminal. <p>The correct value of the exterior condenser constant differs depending on the type of ceramic oscillator used. To determine the constant, refer to the oscillator manufacturer.</p> <p>External CK Pulse is used, connect Resistor (min. 20 kΩ) in series.</p>	

PIN No.	SYMBOL	FUNCTIONAL DESCRIPTION	EQUIVALENT CIRCUIT
18	V _{CC}	<ul style="list-style-type: none"> Supply Voltage Input Terminal. 	
19	CT	<ul style="list-style-type: none"> Phase Compensation Terminal. <p>Connect Capacitor between pin (19) and GND.</p>	
20 26 27	L _c L _b L _a	<ul style="list-style-type: none"> Output Terminals. 	
21	R _F	<ul style="list-style-type: none"> Power Supply Voltage Input Terminal. <p>By connecting resistors between V_{CC} terminal and pin (21), Current Limiter is available.</p> $I_{LIM} = \frac{V_{ISD}}{R_{INF}}$ <p>V_{ISD} = 0.14V I_O (MAX.) = 0.5A</p>	
22 23 24	φC φB φA	<ul style="list-style-type: none"> Capacitor Connect Terminal for prevention of oscillation. 	
25 Fin	GND	<ul style="list-style-type: none"> GND 	

MAXIMUM RATINGS (Ta = 25°C)

CHARACTERISTIC	SYMBOL	RATING	UNIT
Supply Voltage	V _{CC}	8	V
Output Current	I _O	0.6	A
Power Dissipation	P _D	1.0	W
		1.5 (Note)	
Operating Temperature	T _{opr}	-30~75	°C
Storage Temperature	T _{stg}	-55~150	°C

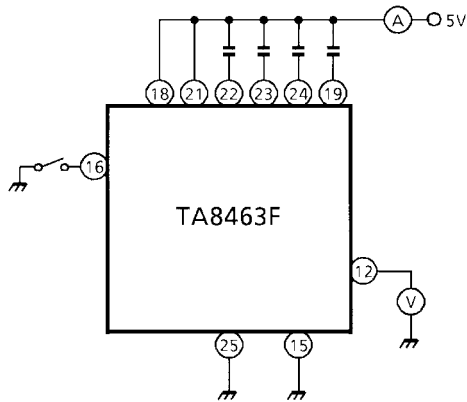
Note: With Heat-Sink (60 × 60 × 1.6 mm Cu 50%)

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

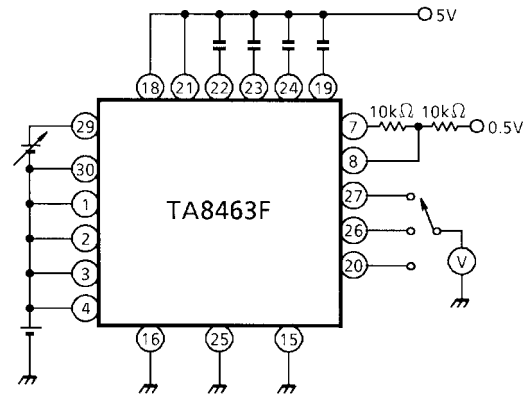
CHARACTERISTIC		SYMBOL	TEST CIR-CUIT	TEST CONDITION	MIN	TYP.	MAX	UNIT	
Supply Current		I _{CC1}	1	SB = OPEN, output open	—	125	200	μA	
		I _{CC2}	1	SB = GND, output open	—	23.9	36	mA	
Hall Amp.	Gain	G _{HO}	—	Output connection state	—	31	—	dB	
	Input Sensitivity	V _H	2		50	—	300	mV _{p-p}	
	Common Mode Voltage Range	V _{CMRH}	2		1.3	—	V _{CC} -0.9	V	
PG Amp.	Closed Loop Gain	G _{FGO}	3		40	46	50	dB	
	Reference Voltage	V _{ref}	3		2.15	2.6	2.9	V	
	Input Sensitivity	V _{HFG}	3		—	2.5	—	mV _{p-p}	
	Input Offset Voltage	V _{OFG}	3		—	1	—	mV	
Integrator Amp.	Output Voltage	High	V _{INT-H}	4		3.4	3.8	4.7	V
		Low	V _{INT-L}	4		0.4	1.0	1.6	V
	A-Input Current		I _{A-}	4		—	—	0.4	μA
	Open Loop Gain		G _{INT}	—	-3 dB point	—	55	—	dB
Speed Changing	Input Switching Voltage	V _{MS-th}	5	H: 360 rpm	3.0	—	V _{CC}	V	
				L: 300 rpm	0	—	2.0		
Input Current		I _{MS}	5	V _{MS} = GND	—	-2.5	0.1	μA	
OSC Frequency Range		f _{osc}	—	T _j = -30~125°C	300	490	600	kHz	

CHARACTERISTIC		SYMBOL	TEST CIR-CUIT	TEST CONDITION	MIN	TYP.	MAX	UNIT	
PWM Output Voltage	High	V _{PWM H}	6	I _{OH} = -100 μA (f _x / 8192) < FG	—	V _{CC} -0.1	—	V	
	Hiddle	V _{PWM M}	6	OUTPUT-V _{CC} : 50 kΩ OUTPUT-GND : 50 kΩ (f _x / 8192) = FG	—	V _{CC} / 2	—	V	
	Low	V _{PWM L}	6	I _{OL} = -100 μA (f _x / 8192) > FG	—	0.1	—	V	
Output Stage	Static Voltage		V _{MID}	—	G _V (INT) = 1 V = (V _{CC} / 2) + 1 V	—	2.2	—	V
	Output Refferencial Voltage-1		V _{M-diff1}	—	G _V (INT) = 1 V = (V _{CC} / 2) + 1 V	—	10	60	mV
	Output Refferencial Voltage-2		V _{M-diff2}	—	G _V (INT) = 1 V = (V _{CC} / 2) - 1 V H _a = H _b = H _c = V _{CC} / 2	—	0.4	—	V
	Saturation Voltage	Upper	V _{sat U}	7	I _O = 500 mA		1.1	1.35	V
Lower		V _{sat L}	7	I _O = 500 mA		0.5	0.75	V	
Stand-by Input	Switching Voltage		V _{ST-th}	5	H : Stand-by Mode L : Enable Mode	2.4 0	— —	V _{CC} 0.8	V
	Input Current		I _{ST}	5	V _{ST} = GND	—	0.05	1.0	μA
Hall Bias Storation Voltage			V _{SB-SAT}	7	I _{IH} = 10 mA I _{IH} = 20 mA	— —	0.11 0.19	0.3 0.5	V
Current Limit Operating Voltage			V _{ISD}	—	R _f Voltage	—	140	—	mV
Index Stage	Input Current		I _{IDX}	8		—	—	3	μA
	Common Mode Voltage Range		V _{CMRI}	8		1.5	—	V _{CC} -0.3	V
	Hysteresis Width		V _{hys}	—		—	2.5	—	mV
	Output Voltage	Low	V _{IDXL}	8	I _O = 1.0 mA	—	1.0	0.4	V
		High	V _{IDXH}	8	I _O = 1.0 mA	—	V _{CC}	—	V
Maximum Input		V _{INI}	8		—	—	0.3	V _{p-p}	
Index Sensor Bias			V _{REG}	1	R _L = 1 kΩ	2.1	2.5	2.9	V
Thermal Shutdown Operating Temperature			TSD	—		150	—	—	°C

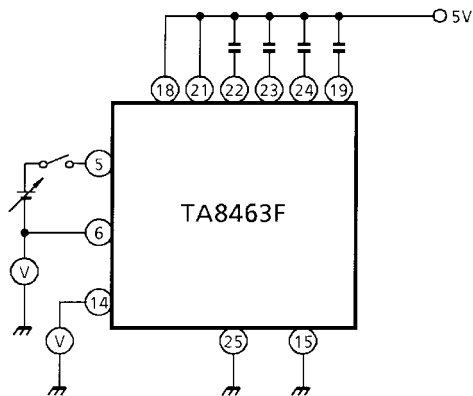
TEST CIRCUIT 1 I_{CC1} , I_{CC2} , V_{REG}



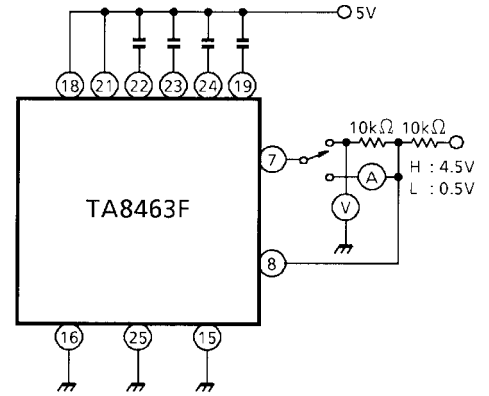
TEST CIRCUIT 2 V_H , V_{CMRH}



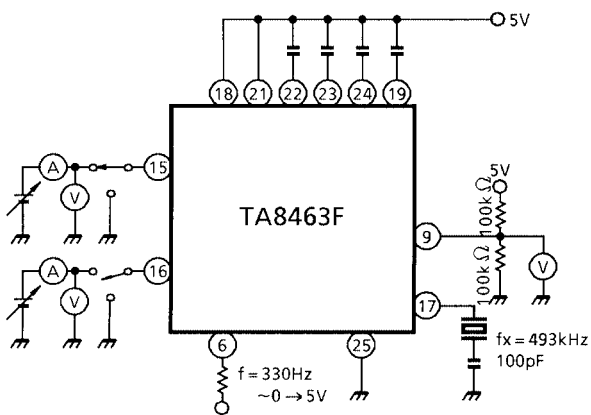
TEST CIRCUIT 3 G_{FGO} , V_{ref} , V_{HFG} , V_{OFG}



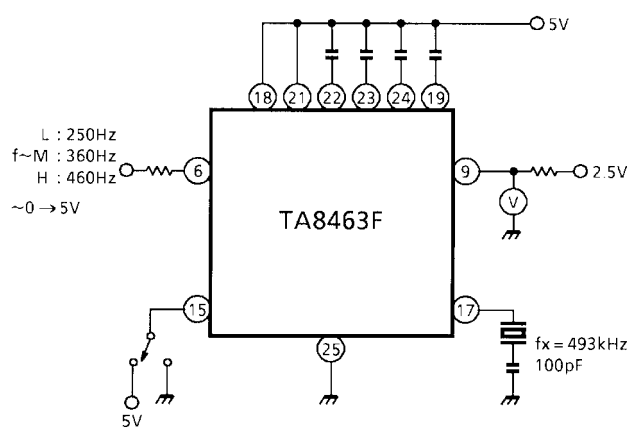
TEST CIRCUIT 4 V_{INT-H} , V_{INT-L} , I_{A-}



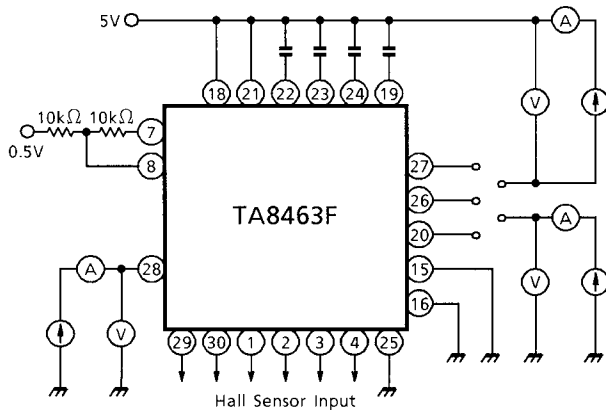
TEST CIRCUIT 5 V_{MS-th} , I_{MS} , V_{ST-th} , I_{ST}



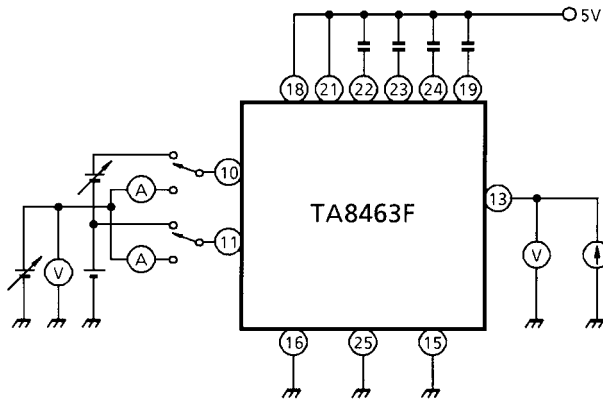
TEST CIRCUIT 6 $V_{PWM H}$, $V_{PWM M}$, $V_{PWM L}$



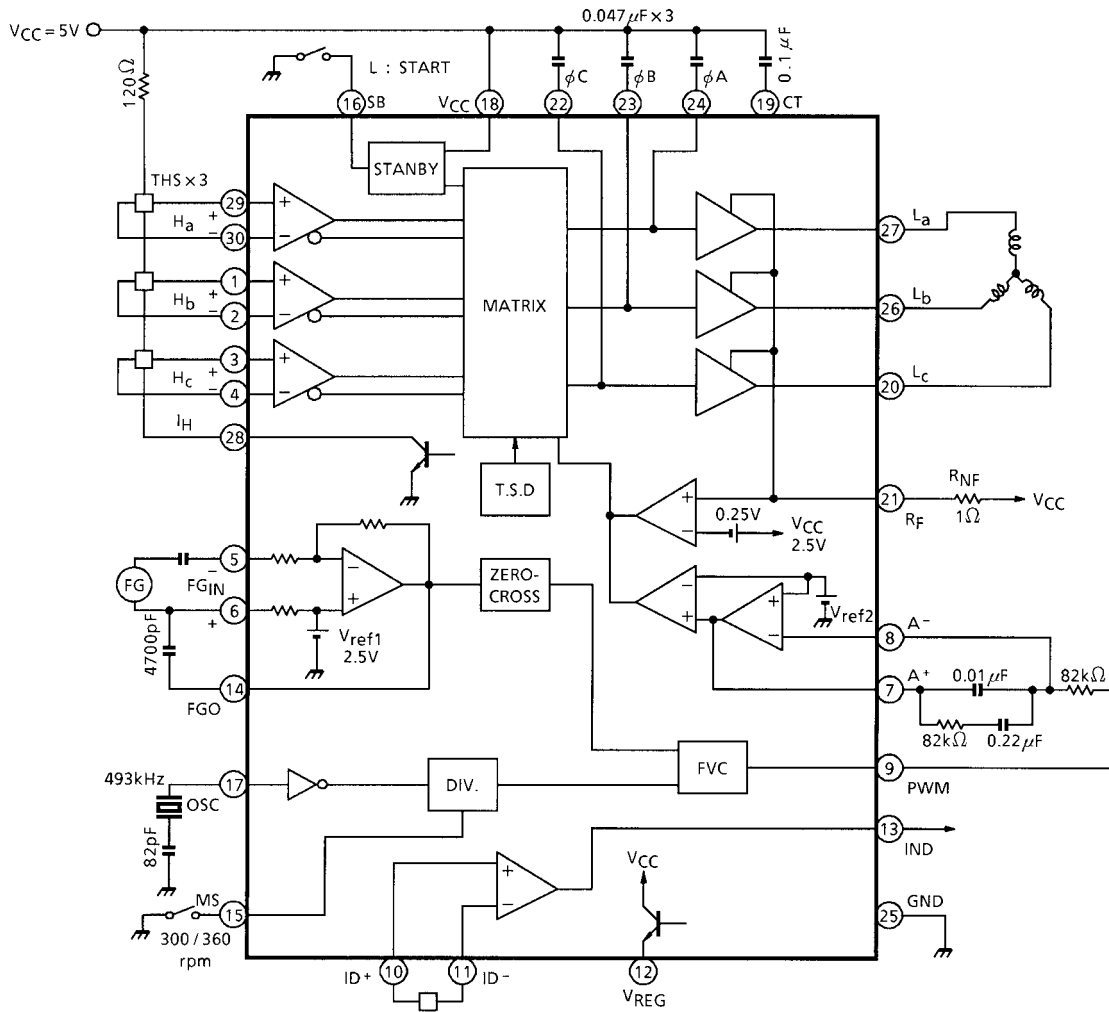
TEST CIRCUIT 7 $V_{sat U}$, $V_{sat L}$, V_{SB-SAT}



TEST CIRCUIT 8 I_{IDX} , V_{CMRI} , V_{TH} , V_{IDXL} , V_{IDXH} , V_{INI}



APPLICATION CIRCUIT

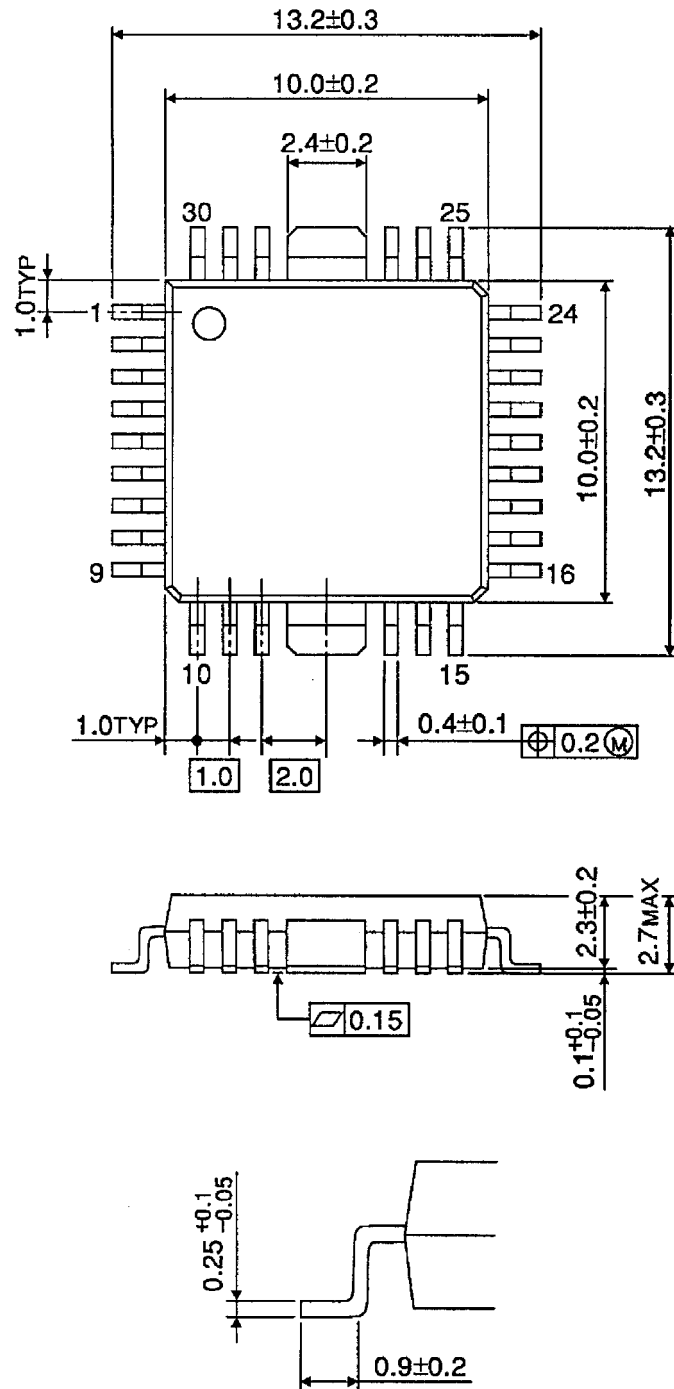


Note: Utmost care is necessary in the design of the output line, V_{CC} and GND line since IC may be destroyed due to short-circuit between outputs, air contamination fault, or fault by improper grounding.

PACKAGE DIMENSIONS

HQFP30-P-1010-1.00

Unit : mm



Weight : 0.61 g (Typ.)

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000707EBA

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