

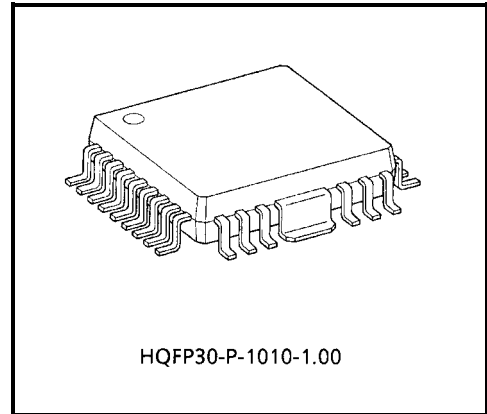
TA8463F

SINGLE CHIP 3 PHASE MOTOR DRIVER FOR FDD SPINDLE MOTOR.

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

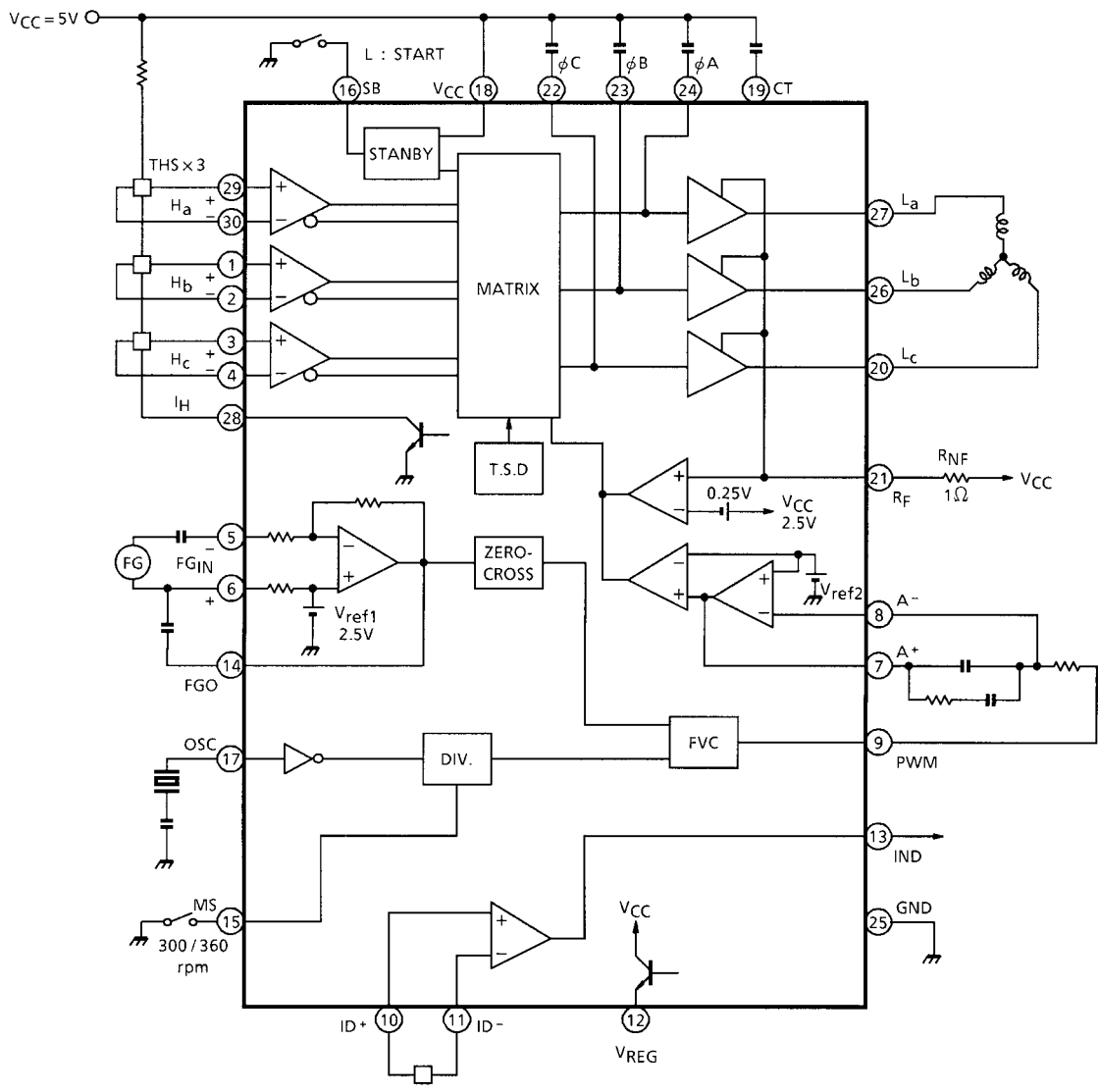
FEATURES

- 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

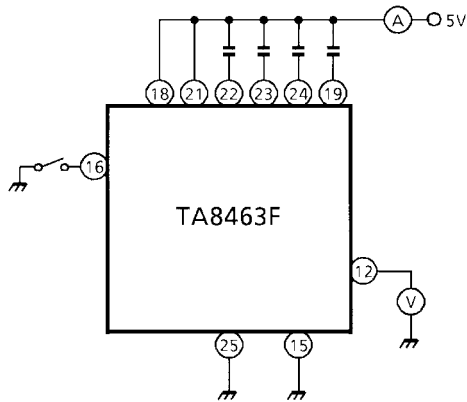
Note: With Heat-Sink (60 × 60 × 1.6 mm Cu 50%)

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

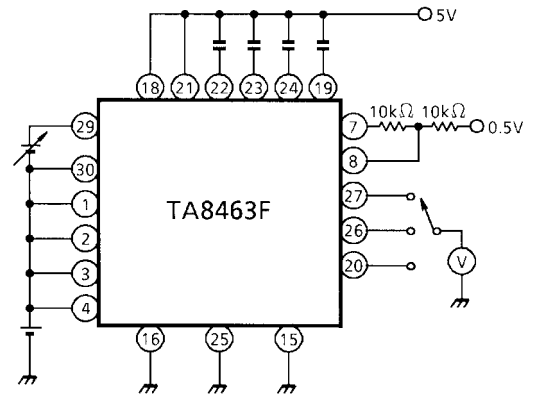
CHARACTERISTIC		SYMBOL	TEST CIR-CUIT	TEST CONDITION	MIN	TYP.	MAX	UNIT	
Supply Current		I _{CC1}	1	SB = OPEN, output open	—	125	200	μA	
		I _{CC2}	1	SB = GND, output open	—	23.9	36	mA	
Hall Amp.	Gain	G _{HO}	—	Output connection state	—	31	—	dB	
	Input Sensitivity	V _H	2		50	—	300	mV _{p-p}	
	Common Mode 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			V	
					L : Enable Mode				
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			V		
				I _{IH} = 20 mA					
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	

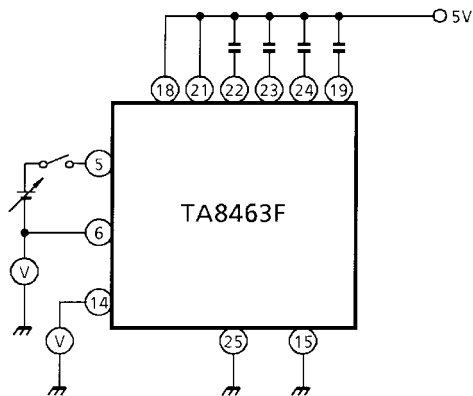
TEST CIRCUIT 1 I_{CC1} , I_{CC2} , V_{REG}



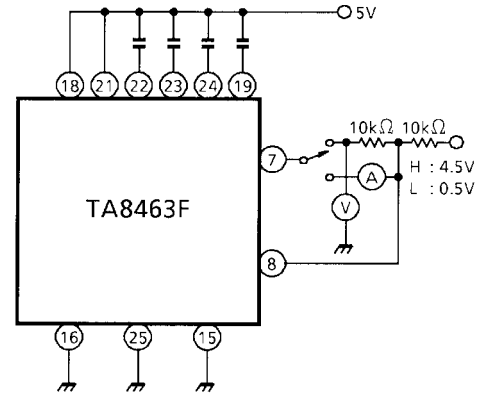
TEST CIRCUIT 2 V_H , V_{CMRH}



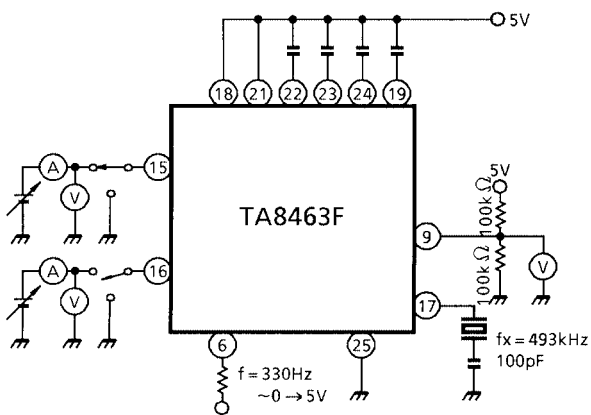
TEST CIRCUIT 3 G_{FGO} , V_{ref} , V_{HFG} , V_{OFG}



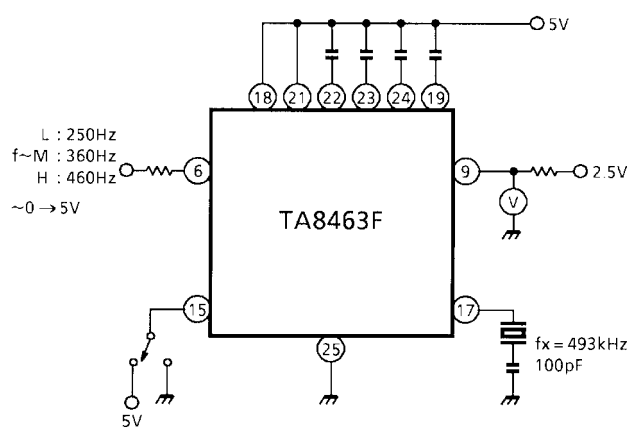
TEST CIRCUIT 4 V_{INT-H} , V_{INT-L} , I_{A-}



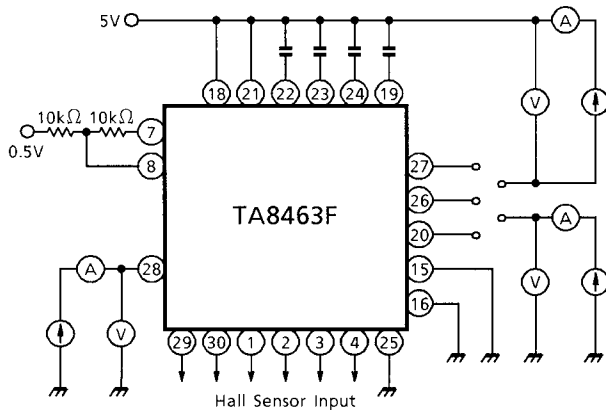
TEST CIRCUIT 5 V_{MS-th} , I_{MS} , V_{ST-th} , I_{ST}



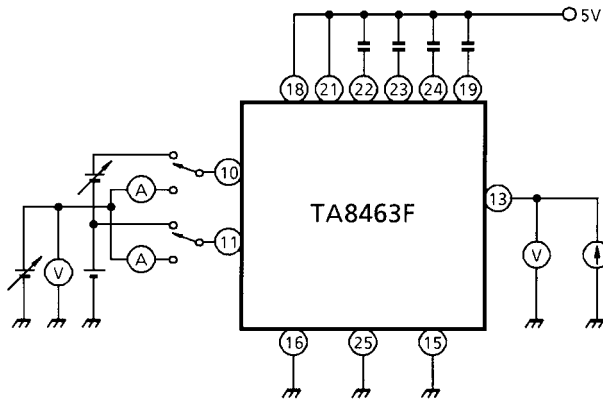
TEST CIRCUIT 6 $V_{PWM H}$, $V_{PWM M}$, $V_{PWM L}$



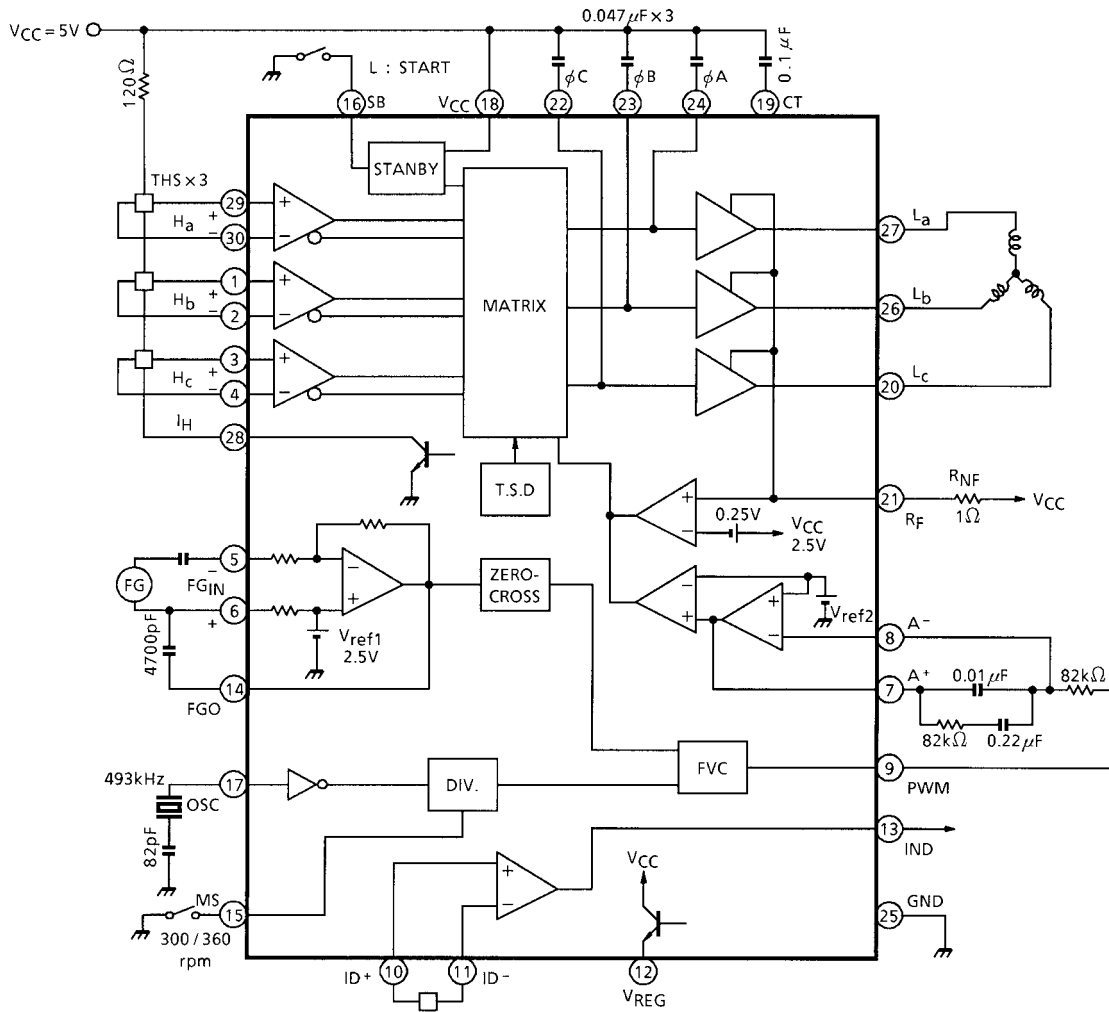
TEST CIRCUIT 7 $V_{sat U}$, $V_{sat L}$, V_{SB-SAT}



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



APPLICATION CIRCUIT

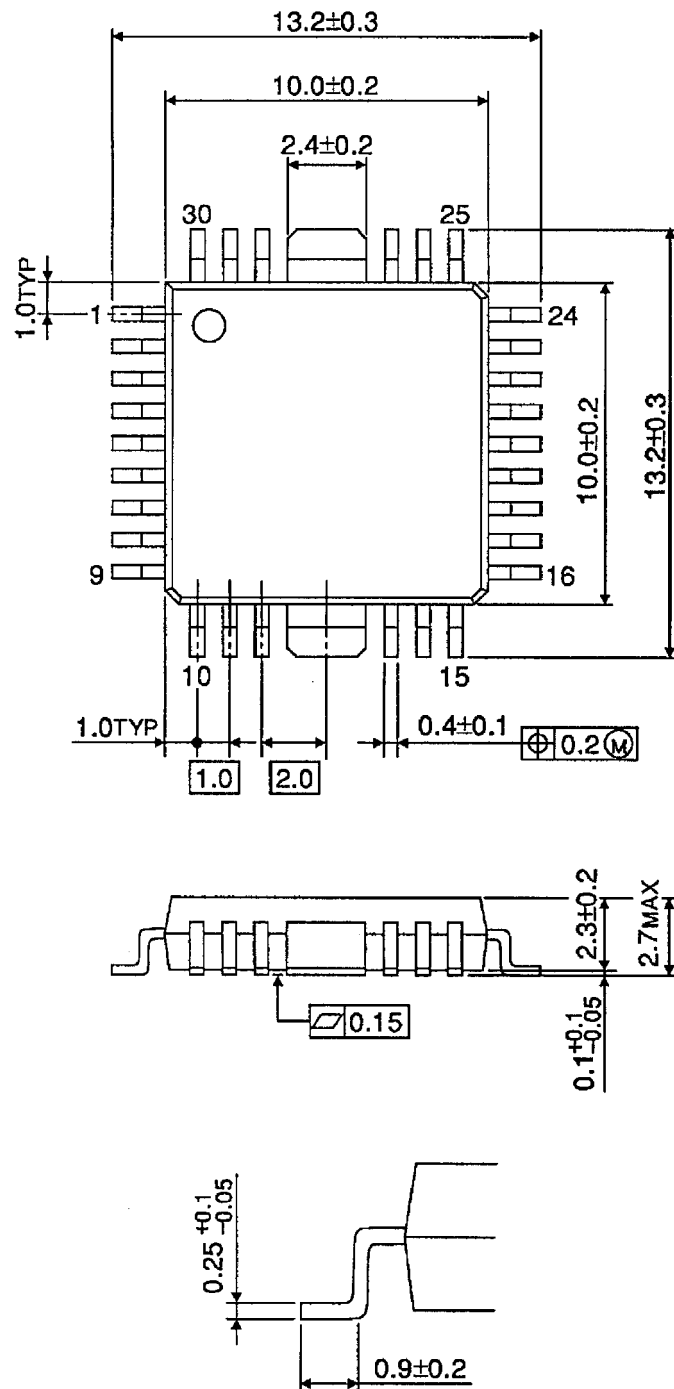


Note: Utmost care is necessary in the design of the output line, VCC and GND line since IC may be destroyed due to short-circuit between outputs, air contamination fault, or fault by improper grounding.

PACKAGE DIMENSIONS

HQFP30-P-1010-1.00

Unit : mm



Weight : 0.61 g (Typ.)

RESTRICTIONS ON PRODUCT USE

000707EBA

- TOSHIBA is continually working to improve the quality and reliability of its products. Nevertheless, semiconductor devices in general can malfunction or fail due to their inherent electrical sensitivity and vulnerability to physical stress. It is the responsibility of the buyer, when utilizing TOSHIBA products, to comply with the standards of safety in making a safe design for the entire system, and to avoid situations in which a malfunction or failure of such TOSHIBA products could cause loss of human life, bodily injury or damage to property.
In developing your designs, please ensure that TOSHIBA products are used within specified operating ranges as set forth in the most recent TOSHIBA products specifications. Also, please keep in mind the precautions and conditions set forth in the "Handling Guide for Semiconductor Devices," or "TOSHIBA Semiconductor Reliability Handbook" etc..
- The TOSHIBA products listed in this document are intended for usage in general electronics applications (computer, personal equipment, office equipment, measuring equipment, industrial robotics, domestic appliances, etc.). These TOSHIBA products are neither intended nor warranted for usage in equipment that requires extraordinarily high quality and/or reliability or a malfunction or failure of which may cause loss of human life or bodily injury ("Unintended Usage"). Unintended Usage include atomic energy control instruments, airplane or spaceship instruments, transportation instruments, traffic signal instruments, combustion control instruments, medical instruments, all types of safety devices, etc.. Unintended Usage of TOSHIBA products listed in this document shall be made at the customer's own risk.
- The products described in this document are subject to the foreign exchange and foreign trade laws.
- The information contained herein is presented only as a guide for the applications of our products. No responsibility is assumed by TOSHIBA CORPORATION for any infringements of intellectual property or other rights of the third parties which may result from its use. No license is granted by implication or otherwise under any intellectual property or other rights of TOSHIBA CORPORATION or others.
- The information contained herein is subject to change without notice.