

TOSHIBA BIPOLAR LINEAR INTEGRATED CIRCUIT SILICON MONOLITHIC

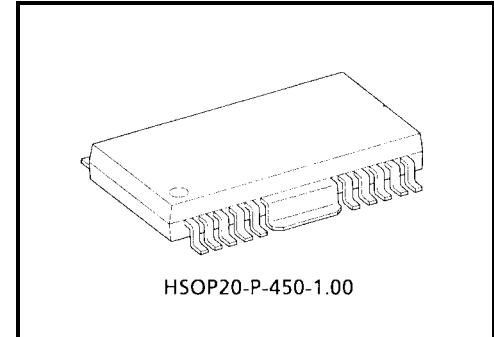
# TA8068F

## Intelligent Stepping Motor Driver

The TA8068F is a stepping motor driver with a current capacity of 1.5A. Inputs INA and INB are combined to control the four outputs.

Since the inputs are TTL-compatible, this IC can be controlled directly from a CPU or other control system.

The IC also incorporates various protective functions as well as a self-diagnostic function for diagnostic function for diagnostic output.

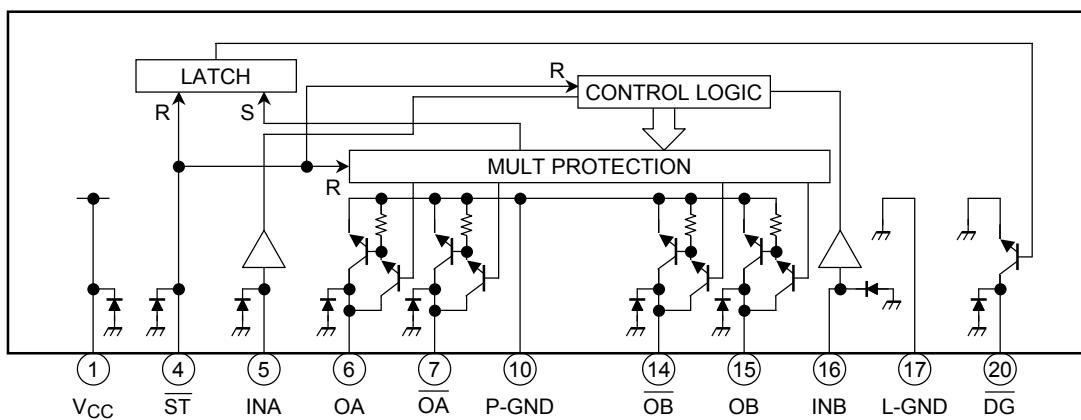


Weight: 0.79 g (typ.)

## FEATURES

- Output current capacity : 1.5 A (max)
- Low standby current : 0.1 mA (max)
- Built-in Protective Functions : Over-Voltage Protection/ Short-Circuit Protection(latch) / Thermal-Shutdown
- Self-diagnostic Output : On Short-Circuit Detection
- Recommended operating supply voltage range : VCC = 8~16 V
- Separate GND for output and logic control sections
- HSOP20-Pin Power Flat Pakage

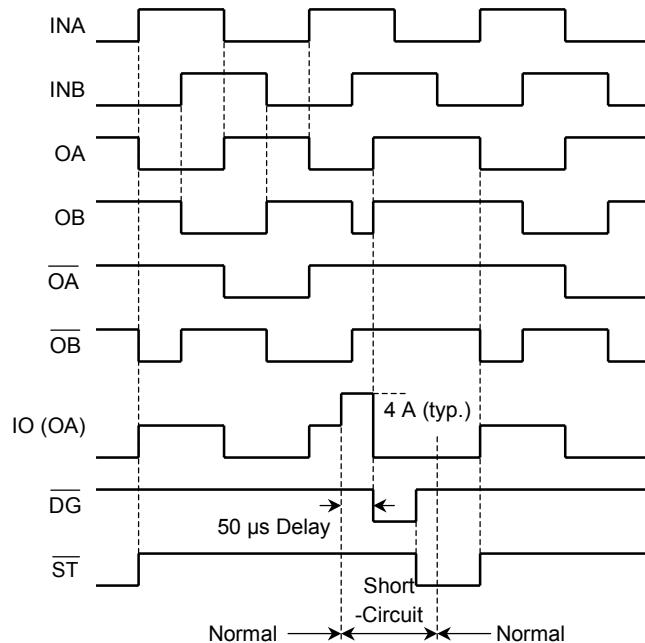
## BLOCK DIAGRAM AND PIN LAYOUT



## PIN DESCRIPTION

PIN No.	SYMBOL	DESCRIPTION
1	V <sub>CC</sub>	Power supply pin. This pin has a function to turn off the output when the applied voltage exceeds 30V (Typ.), thus protecting the IC and the motor load.
4	ST	When this pin is opened or grounded, the output turns off, thus reducing the current consumption to 100µA or less. If standby mode is not needed, the pin is connected to V <sub>CC</sub> .
5	INA	This is input terminal which controls output condition of pin 6 and pin 7. PNP-type voltage comparator is built in.
6	OA	PNP-type complementary output pin with a current capacity of 1.5A. This pin is controlled by the input from pin 5. When the output is supplied with a current exceeding the detection current (4A Typ.) because of load short-circuit, the output is latched to the OFF state after a 50µs (Typ.) delay in order to protect the IC.
7	OA	Output pin of the inversion of pin 6. This terminal has the same function as pin 6 and is controlled by pin 5.
10	P-GND	Ground terminal of output section which is usually connected with pin 17.
14	OB	Output pin of the inversion of pin 15. This terminal has the same function as pin 6 and is controlled by pin 16.
15	OB	This terminal has the same function as pin 6 and is controlled by pin 16.
16	INB	This is input terminal which controls output condition of pin 14 and pin 15. PNP-type voltage comparator is built in.
17	L-GND	Ground terminal of logic control section which is usually connected with pin 10.
20	DG	Self-diagnostic output pin. This signal goes low when the output is short-circuited while the input is on (high). The output will be latched after a 50µs (Typ.) delay when the load is short-circuited. This pin supplies an NPN open-collector output.
2, 3, 8, 9, 11, 12, 13, 18, 19	N.C	Not connected. (Electrically, this pin is completely open.)

## TIMING CHART



## TRUTH TABLE INPUT / OUTPUT

INPUT			OUTPUT				
INA	INB	ST	OA	OA	OB	OB	DG
L	L	H	OFF	ON	OFF	ON	OFF
L	H	H	OFF	ON	ON	OFF	OFF
H	L	H	ON	OFF	OFF	ON	OFF
H	H	H	ON	OFF	ON	OFF	OFF
—	—	L	OFF	OFF	OFF	OFF	OFF
—	—	OPEN	OFF	OFF	OFF	OFF	OFF

## MAXIMUM RATINGS (Ta = 25°C)

CHARACTERISTIC	SYMBOL	RATING	UNIT
Supply Voltage	V <sub>CC</sub>	30	V
	V <sub>CC</sub>	60 (1s)	
Input Voltage	V <sub>IN</sub>	-0.3~7	V
Output Voltage	V <sub>OUT</sub>	-0.3~V <sub>CC</sub>	V
Output Current	I <sub>O</sub> ·AVE	1.5 (*1)	A
Power Dissipation	P <sub>D</sub>	2.0 (*2)	W
Operation Temperature	T <sub>opr</sub>	-40~110	°C
Storage Temperature	T <sub>stg</sub>	-55~150	°C
Lead Temperature-Time	T <sub>sol</sub>	260 (10s)	°C

Note \*1: Maximum current value when an infinite heat sink is used. Please refer to the table "MAXIMUM OUTPUT CURRENT (RECOMMENDED VALUES FOR APPLICATION)" when designing an application circuit.

Note \*2: 50 × 50 × 1.6 mm 50% Cu mounted

## HSOP20-P-450-1.00 THERMAL RESISTANCE DATA (Ta = 25°C)

CHARACTERISTIC	TEST CONDITION	RATING	UNIT
R <sub>θj-a</sub>	—	125	°C/W
R <sub>θj-c</sub>	—	13	°C/W
P <sub>D1</sub>	Without radiation board	9.6	W
P <sub>D2</sub>	50 × 50 × 1.0 mm Iron board mounted	3.2	W
P <sub>D3</sub>	50 × 50 × 1.6 mm 50% Cu mounted	2.0	W
P <sub>D4</sub>	Without radiation board	1.0	W

## MAXIMUM OUTPUT CURRENT (RECOMMENDED VALUES FOR APPLICATION)

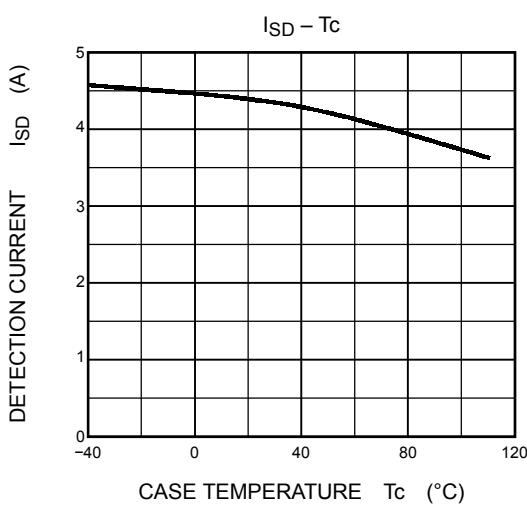
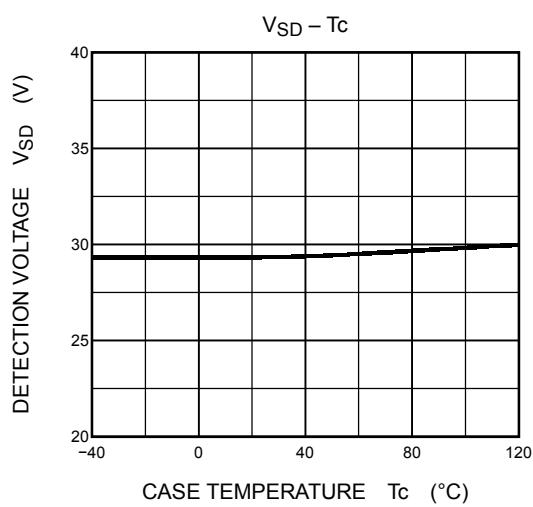
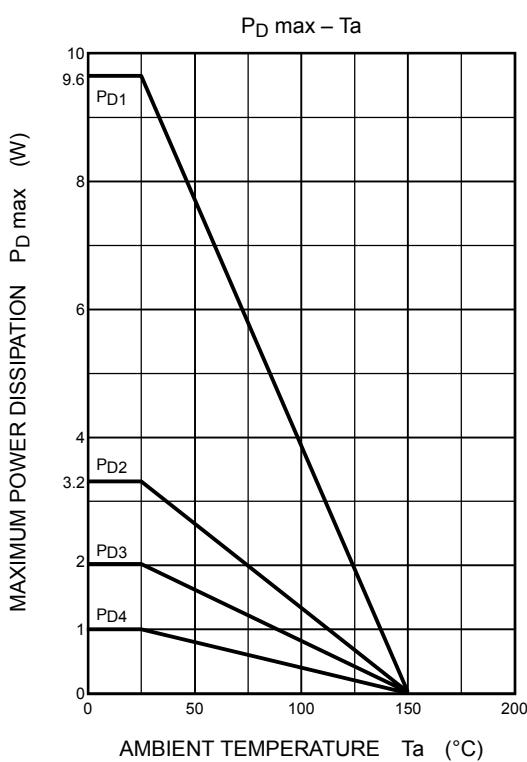
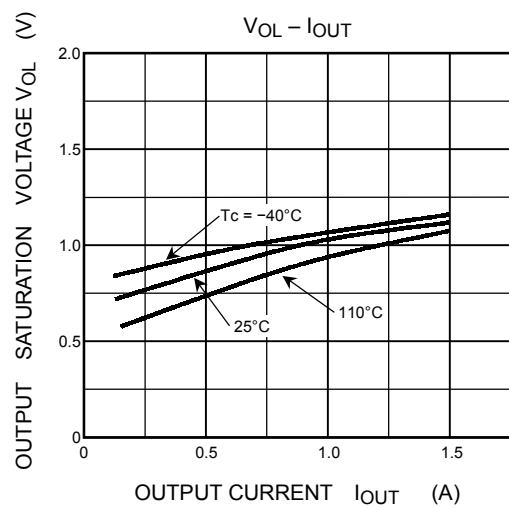
Ambient Temperature Ta (°C)	Heat Radiation Condition	Allowable Rating (DC)		Allowable Power Dissipation (pulse: 10 sec)	
		Power dissipation (W)	Output current (mA)	Power dissipation (W)	Output current (mA)
25	IC itself	1.0	330	2.9	1000
	Using a board (PD3)	2.0	720	3.9	1040
85	IC itself	0.52	50	1.5	550
	Using a board (PD3)	1.04	350	2.0	720
105	IC itself	0.36	0	1.0	330
	Using a board (PD3)	0.72	150	1.4	500

V<sub>CC</sub> = 16 V. Output current is defined by the maximum current in one channel.

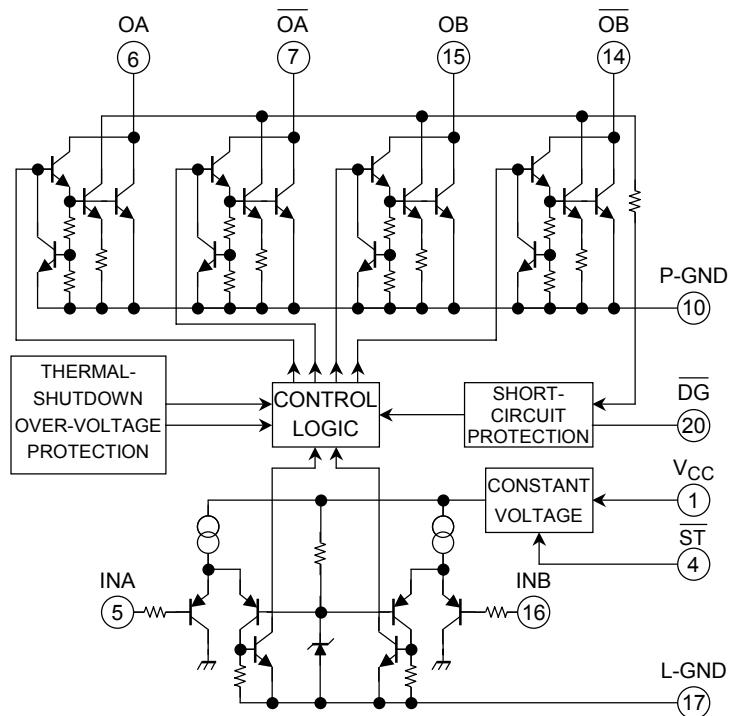
ELECTRICAL CHARACTERISTICS (V<sub>CC</sub> = 8~16 V, T<sub>C</sub> = -40~110°C, unless otherwise specified)

CHARACTERISTIC	SYMBOL	PIN	TEST CIR-CUIT	TEST CONDITION	MIN	TYP.	MAX	UNIT
Current Consumption	I <sub>CC</sub>	V <sub>CC</sub>	—	—	12	25	40	mA
Input Voltage	V <sub>IL</sub>	INA/INB	—	—	—	—	0.8	V
	V <sub>IH</sub>		—	—	2.4	—	—	
Input Current	I <sub>IL</sub>	INA/INB	—	V <sub>IN</sub> = 0.4 V	-50	—	—	μA
	I <sub>IH</sub>		—	V <sub>IN</sub> = 5 V	—	—	10	
Input Voltage	V <sub>IL</sub>	ST	—	—	—	—	0.8	V
	V <sub>IH</sub>		—	—	3.0	—	—	
Output Saturation Voltage	V <sub>SAT</sub>	OA, OB, OA, OB	—	I <sub>O</sub> = 1.5 A/Ta = 25°C	—	1.25	1.5	V
Output Leakage Current	I <sub>LEAK</sub>	OA, OB, OA, OB	—	V <sub>O</sub> = V <sub>CC</sub>	—	—	10	μA
Output Voltage	V <sub>OL</sub>	DG	—	I <sub>OL</sub> = 3 mA	—	—	0.3	V
Output Leakage Current	I <sub>LEAK</sub>		—	V <sub>O</sub> = V <sub>CC</sub>	—	—	10	μA
Over-current Detection	ISD	—	—	—	1.8	4	6	A
Shutdown Temperature	TSD-H	—	—	OUT = ON → OFF	—	160	—	°C
	TSD-L	—	—	OUT = OFF → ON	—	130	—	
Over-voltage Detection	V <sub>SD</sub>	—	—	—	27.5	30	33	V
Standby Current	I <sub>ST</sub>	V <sub>CC</sub>	—	ST = GND	—	—	100	μA
Transfer Delay Time	t <sub>PLH</sub>	—	—	—	—	1	10	μs
	t <sub>PHL</sub>	—	—	—	—	1	10	

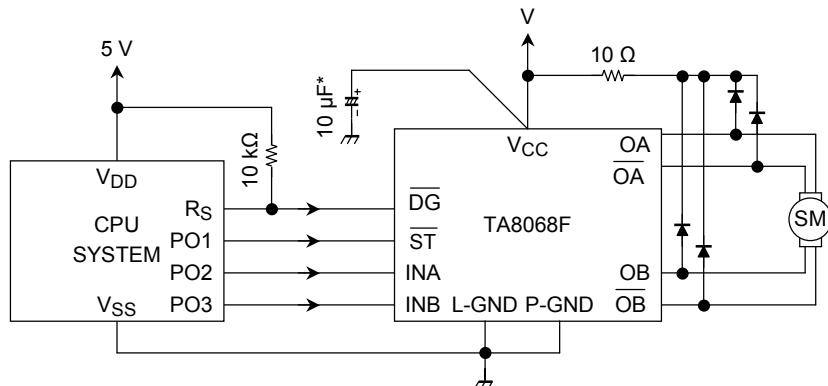
Note: The parameter values above are guaranteed in the operating voltage range of 8 V to 16 V. If the guaranteed range is exceeded in practical use, make sure that the IC operates normally in application.



## EQUIVALENT CIRCUIT



## APPLICATION CIRCUIT

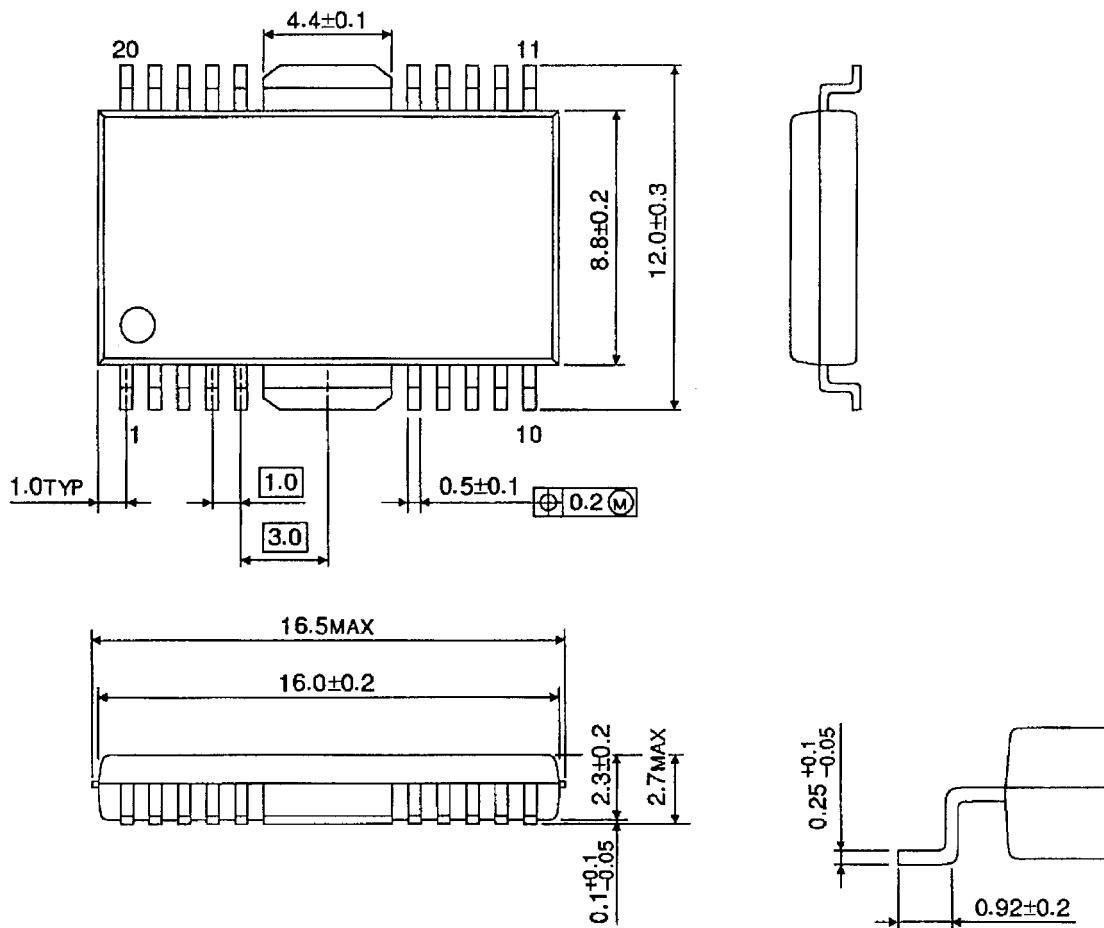


\*: Connect this capacitor as close to the IC as possible

**PACKAGE DIMENSIONS**

HSOP20-P-450-1.00

Unit : mm



Weight: 0.79 g (Typ.)

## RESTRICTIONS ON PRODUCT USE

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