

TOSHIBA BIPOLAR LINEAR INTEGRATED CIRCUIT SILICON MONOLITHIC

TA8068F

Intelligent Stepping Motor Driver

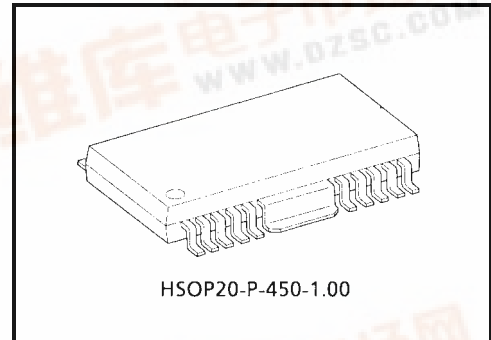
The TA8068F is a stepping motor driver with a current capacity of 1.5A. Inputs INA and INB are combined to control the four outputs.

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.

FEATURES

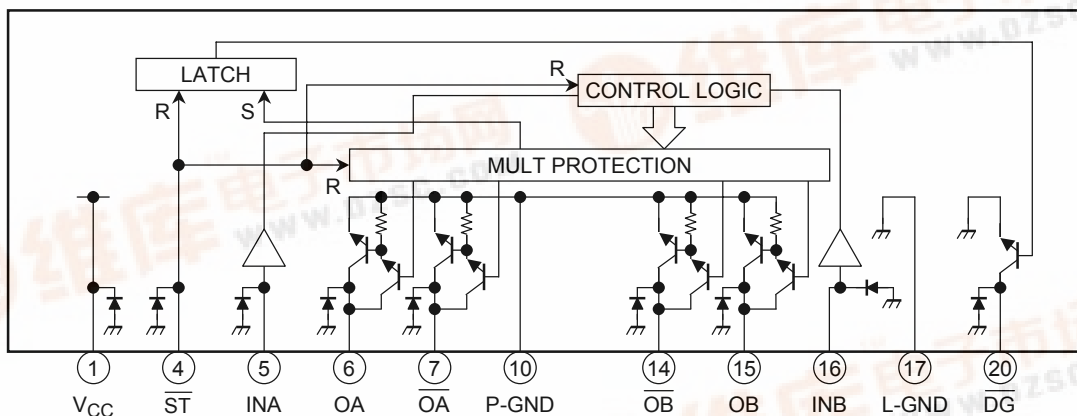
- Output current capacity : 1.5 A (max)
- Low standby current : 0.1 mA (max)
- Built-in Protective Functions : Over-Voltage Protection/ Short-Circuit Protection(latch) / Thermal-Shutdown
- Self-diagnostic Output : On Short-Circuit Detection
- Recommended operating supply voltage range : $V_{CC} = 8\sim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



HSOP20-P-450-1.00

Weight: 0.79 g (typ.)

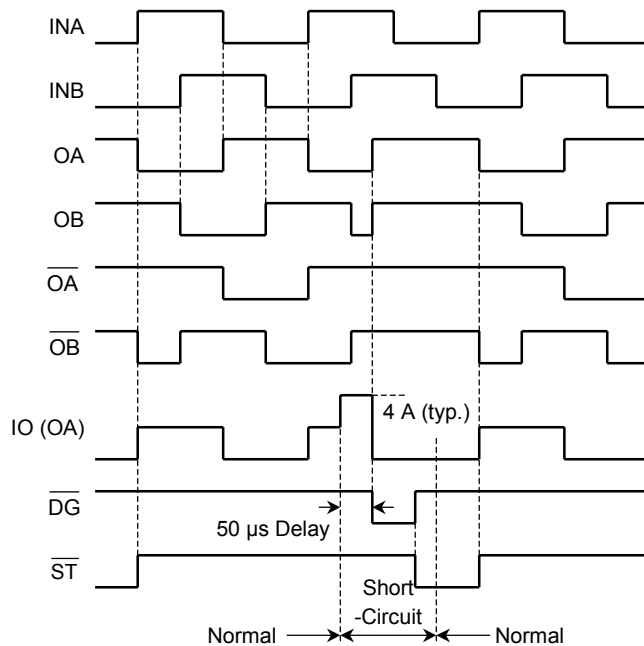
BLOCK DIAGRAM AND PIN LAYOUT



PIN DESCRIPTION

PIN No.	SYMBOL	DESCRIPTION
1	V _{CC}	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	\overline{ST}	When this pin is opened or grounded, the output turns off, thus reducing the current consumption to 100 μ A or less. If standby mode is not needed, the pin is connected to V _{CC} .
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 50 μ s (Typ.) delay in order to protect the IC.
7	\overline{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	\overline{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	\overline{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 50 μ s (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	\overline{ST}	OA	\overline{OA}	OB	\overline{OB}	\overline{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 _{CC}	30	V
	V _{CC}	60 (1s)	
Input Voltage	V _{IN}	-0.3~7	V
Output Voltage	V _{OUT}	-0.3~V _{CC}	V
Output Current	I _O :AVE	1.5 (*1)	A
Power Dissipation	P _D	2.0 (*2)	W
Operation Temperature	T _{opr}	-40~110	°C
Storage Temperature	T _{stg}	-55~150	°C
Lead Temperature-Time	T _{sol}	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 _{θ j-a}	—	125	°C/W
R _{θ j-c}	—	13	°C/W
P _{D1}	Without radiation board	9.6	W
P _{D2}	50 × 50 × 1.0 mm Iron board mounted	3.2	W
P _{D3}	50 × 50 × 1.6 mm 50% Cu mounted	2.0	W
P _{D4}	Without radiation board	1.0	W

MAXIMUM OUTPUT CURRENT (RECOMMENDED VALUES FOR APPLICATION)

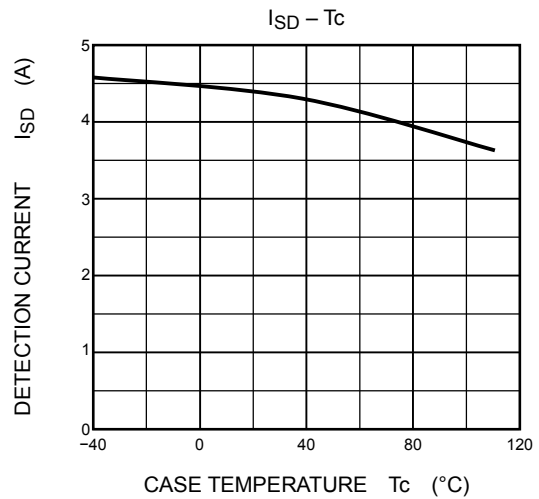
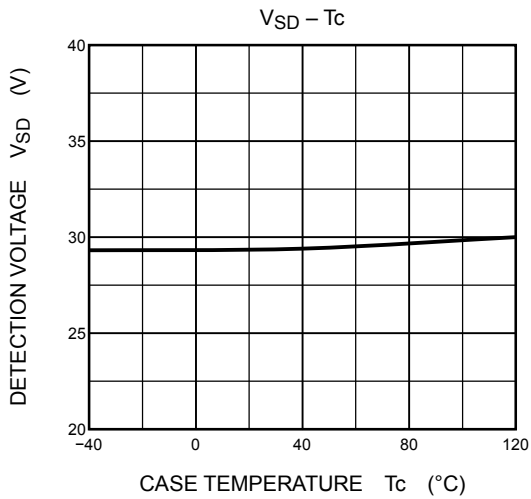
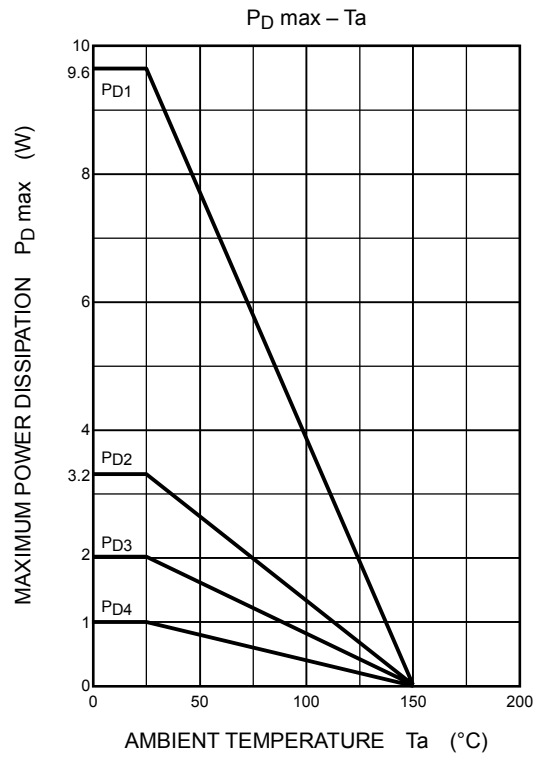
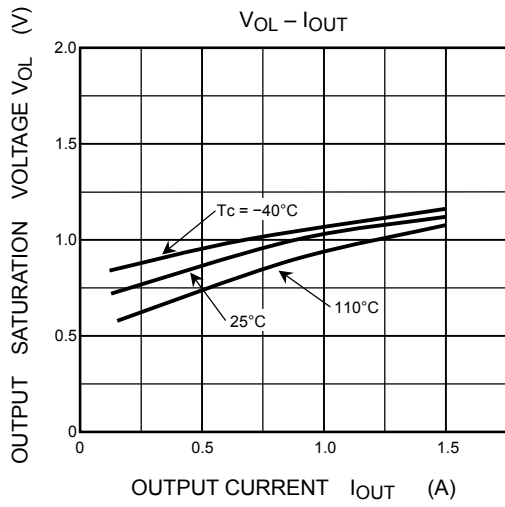
Ambient Temperature Ta (°C)	Heat Radiation Condition	Allowable Rating (DC)		Allowable Power Dissipation (pulse: 10 sec)	
		Power dissipation (W)	Output current (mA)	Power dissipation (W)	Output current (mA)
25	IC itself	1.0	330	2.9	1000
	Using a board (PD3)	2.0	720	3.9	1040
85	IC itself	0.52	50	1.5	550
	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_{CC} = 16 V. Output current is defined by the maximum current in one channel.

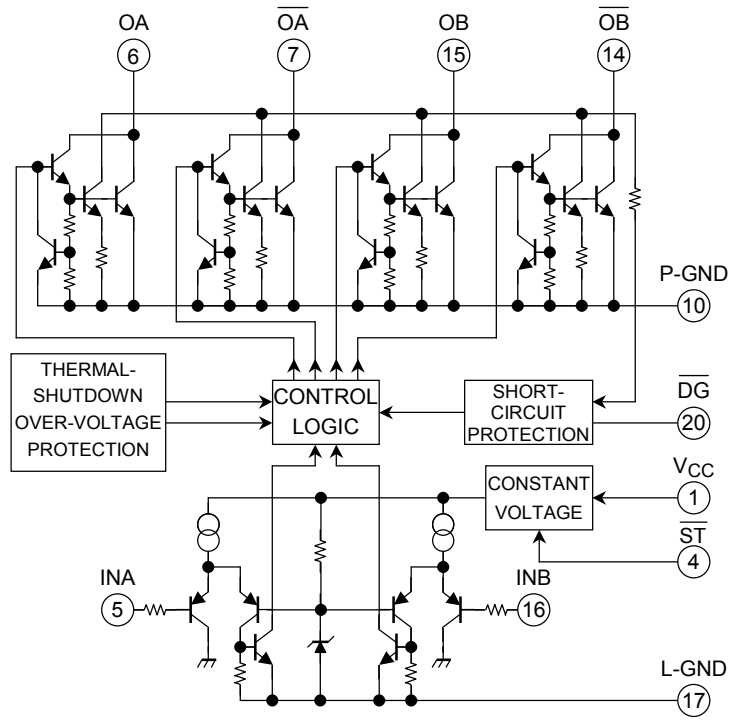
ELECTRICAL CHARACTERISTICS (V_{CC} = 8~16 V, T_c = -40~110°C, unless otherwise specified)

CHARACTERISTIC	SYMBOL	PIN	TEST CIR-CUIT	TEST CONDITION	MIN	TYP.	MAX	UNIT
Current Consumption	I _{CC}	V _{CC}	—	—	12	25	40	mA
Input Voltage	V _{IL}	INA/INB	—	—	—	—	0.8	V
	V _{IH}		—	—	2.4	—	—	
Input Current	I _{IL}	INA/INB	—	V _{IN} = 0.4 V	-50	—	—	μA
	I _{IH}		—	V _{IN} = 5 V	—	—	10	
Input Voltage	V _{IL}	ST	—	—	—	—	0.8	V
	V _{IH}		—	—	3.0	—	—	
Output Saturation Voltage	V _{SAT}	OA, \overline{OA} OB, \overline{OB}	—	I _O = 1.5 A/Ta = 25°C	—	1.25	1.5	V
Output Leakage Current	I _{LEAK}	OA, \overline{OA} OB, \overline{OB}	—	V _O = V _{CC}	—	—	10	μA
Output Voltage	V _{OL}	DG	—	I _{OL} = 3 mA	—	—	0.3	V
Output Leakage Current	I _{LEAK}		—	—	V _O = V _{CC}	—	—	10
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 _{SD}	—	—	—	27.5	30	33	V
Standby Current	IST	V _{CC}	—	\overline{ST} = GND	—	—	100	μA
Transfer Delay Time	t _{pLH}	—	—	—	—	1	10	μs
	t _{pHL}	—	—	—	—	1	10	

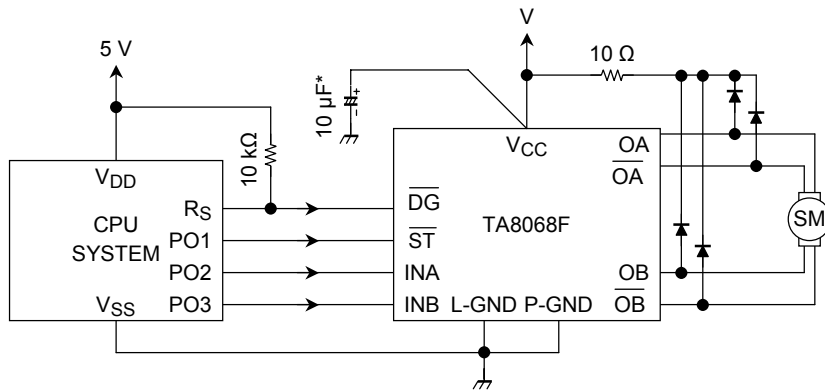
Note: The parameter values above are guaranteed in the operating voltage range of 8 V to 16 V. If the guaranteed range is exceeded in practical use, make sure that the IC operates normally in application.



EQUIVALENT CIRCUIT



APPLICATION CIRCUIT

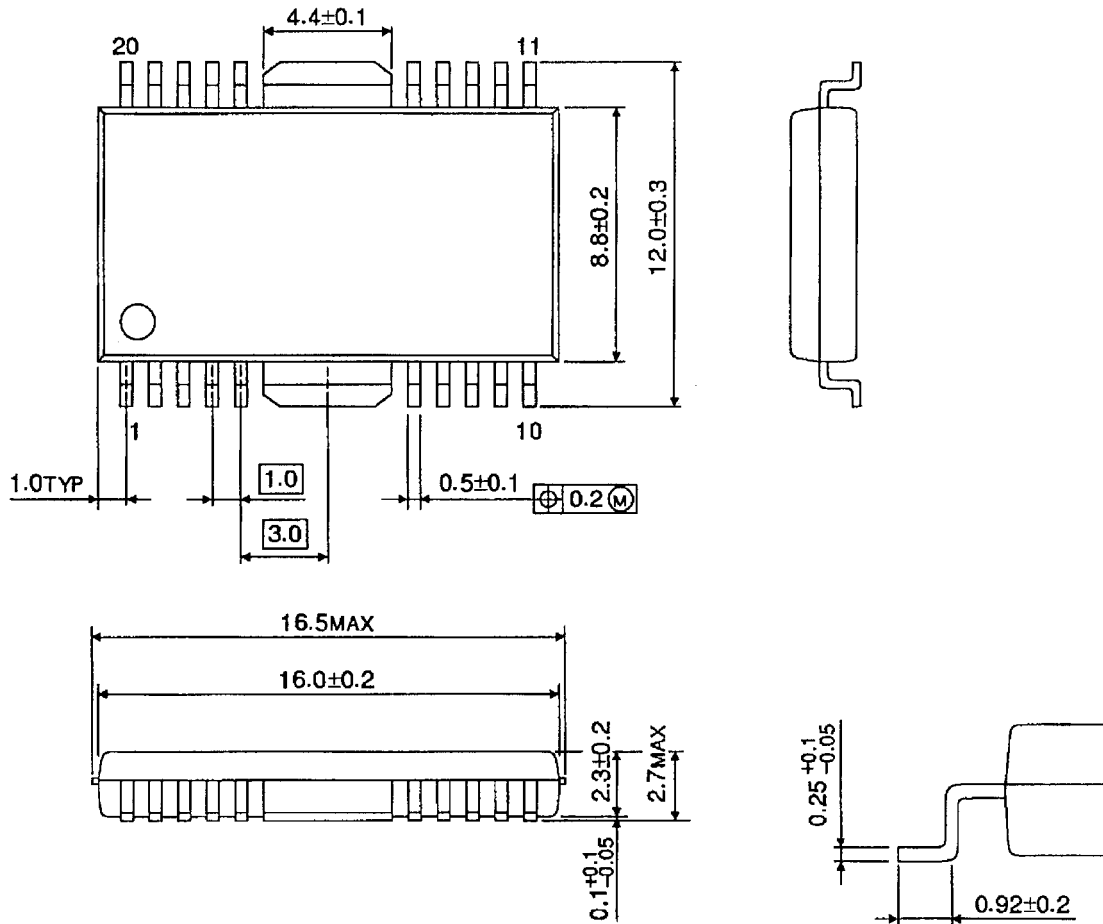


*: Connect this capacitor as close to the IC as possible

PACKAGE DIMENSIONS

HSOP20-P-450-1.00

Unit : mm



Weight: 0.79 g (Typ.)

RESTRICTIONS ON PRODUCT USE

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