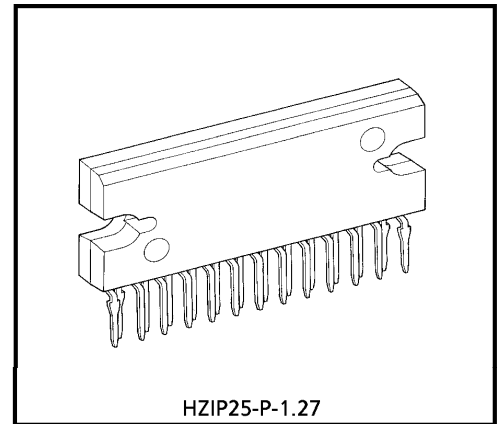


TD62917H

DUAL DC MOTOR DRIVER

The TD62917H contains two motor driver circuits with a current capacity of 1.5 A for directly driving bidirectional DC motors. Inputs DI1A/B and DI2A/B are combined to select one of forward, reverse, stop, and brake modes. Since the inputs are TTL-compatible, this IC can be controlled directly from a CPU or other control system. In addition, the IC also has a low standby current function, a self-diagnostic function, and various protective functions.

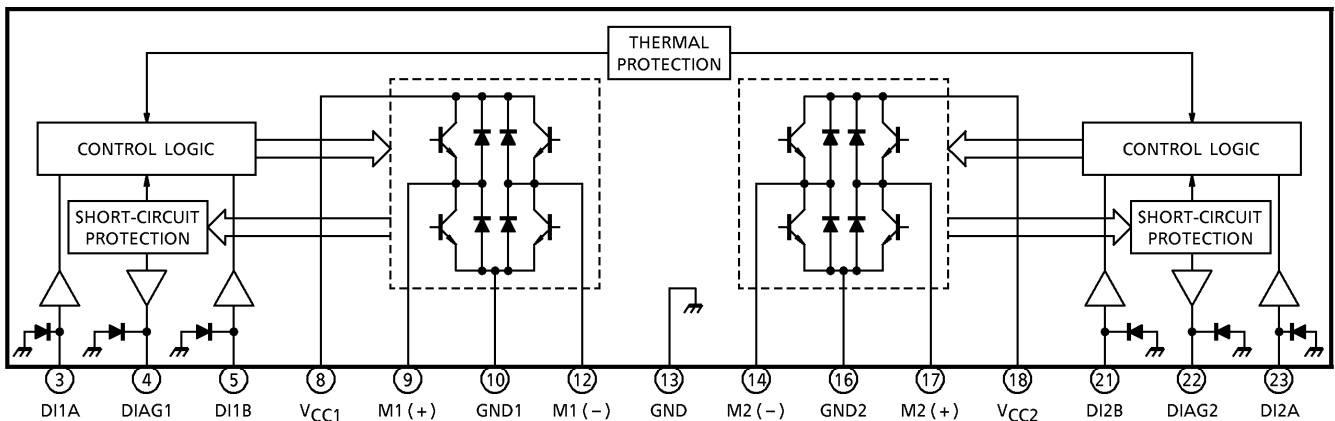


Weight : 5.7 g (Typ.)

FEATURES

- 1.5 A bidirectional DC motor driver
- Two circuits contained (power supply, self-diagnostic, and protective functions provided for each)
- Low standby current : 0.1 mA (Max.)
- Self-diagnostic output
 - Short-circuit : 3 A
 - Open : 10 mA
- Multiple protective functions : Short-circuit, thermal-shutdown protection
- Built-in counter electromotive force absorption diodes.
- Plastic HZIP-25pin

BLOCK DIAGRAM AND PIN LAYOUT



PIN DESCRIPTION

PIN No.		SYMBOL		DESCRIPTION
CH1	CH2	CH1	CH2	
3 5	23 21	DI1A DI1B	DI2A DI2B	Input pin. The signal from this pin controls the output state. (See TRUTH TABLE 1.)
4	22	DIAG1	DIAG2	Self-diagnosis output pin. (See TRUTH TABLE 2 and TIMING CHART.) This signal goes low when the output encounters over-current condition or is opened, whereas it goes high during normal operation or at the time of stop. This pin supplies an NPN open-collector output.
8	18	VCC1	VCC2	Power supply pin.
9	17	M1 (+)	M2 (+)	Connects to the DC motor. Both the sink and the source have a current capacity of 1.5A. The circuit has a short-circuit protection function which protects the IC from load short-circuit, ground fault, or direct connection to high power. Diodes for absorbing counter electromotive force are contained on the VCC and GND sides.
10	16	GND1	GND2	Grounded pin for output section.
12	14	M1 (-)	M2 (-)	A motor is connected between this pin and M (+) pin. This pin has the function equivalent to that of M (+) pin, and is controlled by input to the DIA and DIB pins.
13		GND		Grounded.

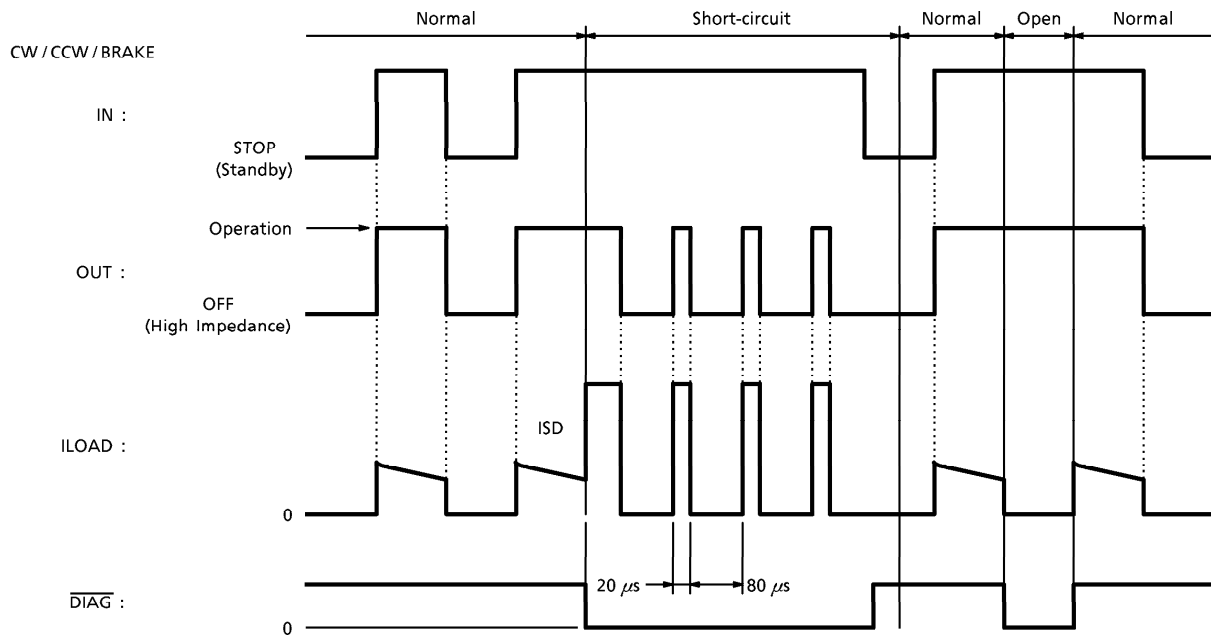
TRUTH TABLE 1 INPUT / OUTPUT

INPUT		OUTPUT		OPERATION MODE
DI1A, DI2A	DI1B, DI2B	M1 (+), M2 (+)	M1 (-), M2 (-)	
H	H	L	L	Brake
L	H	L	H	Reverse (CCW)
H	L	H	L	Forward (CW)
L	L	OFF (High impedance)		Stop (Standby)

TRUTH TABLE 2 SELF-DIAGNOSIS

INPUT		OUTPUT		DIAG
DI1A, DI2A	DI1B, DI2B	MODE	LOAD	
H	H	Brake	Normal	H
			Short	L
			Open	H
H / L	H / L	CCW / CW	Normal	H
			Short	L
			Open	L
L	L	Stop	—	H

SELF-DIAGNOSIS TIMING CHART



MAXIMUM RATINGS (Ta = 25°C)

CHARACTERISTIC	SYMBOL	RATING	UNIT
Power Supply Voltage	V _{CC}	7~30	V
Input Voltage	V _{IN}	-0.3~V _{CC}	V
Output Current	I _O	1.5	A
Power Dissipation	P _D	25	W
Operating Temperature	T _{opr}	-40~85	°C
Storage Temperature	T _{stg}	-55~150	°C
Lead Temperature-time	T _{sol}	260 (10 s)	°C

ELECTRICAL CHARACTERISTICS ($V_{CC} = 24\text{ V}$, $T_c = 25^\circ\text{C}$)

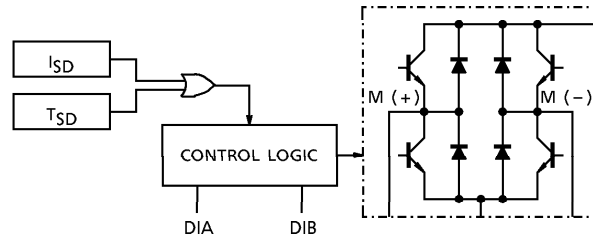
CHARACTERISTIC	SYMBOL	PIN	TEST CIR-CUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Power Supply Current	I_{CC1}	V_{CC1}, V_{CC2}	—	CH1 / 2 Stop	—	—	0.1	mA
	I_{CC2}		—	CH1 or 2 CW / CCW	—	45	65	
	I_{CC3}		—	CH1 / 2 CW / CCW	—	90	120	
	I_{CC4}		—	CH1 / 2 Brake	—	50	70	
Input Voltage	V_{IL}	DI1A, DI1B DI2A, DI2B	—	—	—	—	0.8	V
	V_{IH}		—	—	2.0	—	—	
Input Current	I_{IL}		—	$V_{IN} = 0.4\text{ V}$	—	10	20	μA
	I_{IH}		—	$V_{IN} = V_{CC}$	—	140	300	
Output Saturation Voltage	$V_{sat}(\text{total})$		—	$I_O = 1.5\text{ A}$, $T_c = 25^\circ\text{C}$	—	2.2	2.9	V
Output Leakage Current	$I_{LEAK.U}$	M1 (+), M1 (-)	—	$V_{OUT} = 0\text{ V}$	—	—	-10	μA
	$I_{LEAK.L}$	M2 (+), M2 (-)	—	$V_{OUT} = V_{CC}$	—	—	10	
Diode Forward Voltage	$V_{F.U}$		—	$I_F = 1.5\text{ A}$	—	2.6	—	V
	$V_{F.L}$		—		—	1.5	—	
Output Voltage	V_{OUT}		—	$I_{OL} = 3\text{ mA}$	—	0.2	0.5	V
Output Leakage Current	I_{LEAK}	DIAG1, DIAG2	—	$V_{OUT} = V_{CC}$	—	—	5	μA
Over-current Detection	I_{SD}	—	—	—	2	3	4	A
Load-open Detection	I_{OS}	—	—	—	5	10	20	mA
Shutdown Temperature	T_{SD}	—	—	—	—	150	—	$^\circ\text{C}$
Standby Current	I_{ST}	V_{CC}	—	DI1A, DI1B, DI2A, DI2B = 0V	—	—	100	μA
Thermal Resistance	$R\theta_{j-c}$	—	—	—	—	4	—	$^\circ\text{C} / \text{W}$
Transfer Delay Time	t_{pLH}	—	—	—	—	1	10	μs
	t_{pHL}	—	—	—	—	1	10	

DESCRIPTION OF MULTI-PROTECTIVE OPERATION

The TD62913F has functions for protection from over-current (I_{SD}) and overheat (T_{SD}). These functions protect the IC (and the motor load in some cases) from deterioration or destruction due to power-related over-stress.

These functions work independently.

Each function is explained below.



1. Overheat protection (T_{SD})

- Basic operation

When the junction (chip) temperature is up to the T_{SD} detection temperature, the output is controlled by the input signals. When it exceeds the T_{SD} detection temperature, the output enters high-impedance state regardless of the input signals.

- Detailed explanation

The temperature is detected by monitoring V_F of a diode on the chip. When the diode V_F is lower than the internal reference voltage, an output transistor-off instruction is issued to the control logic. When it is higher than the internal reference voltage, the logic is controlled by the input signals from DIA and DIB.

2. Over-current protection (I_{SD})

- Basic operation

When the output current ($M(+)$ or $M(-)$, I_{sink} or I_{source}) is up to the I_{SD} detection current, the output is controlled by the input signals. When it exceeds the detection current, the output assumes a switching waveform as shown in Fig.1.

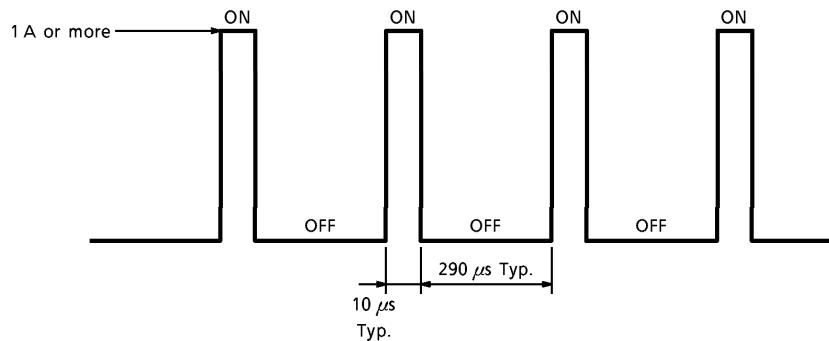


Fig.1 Basic Operation

- Detailed explanation

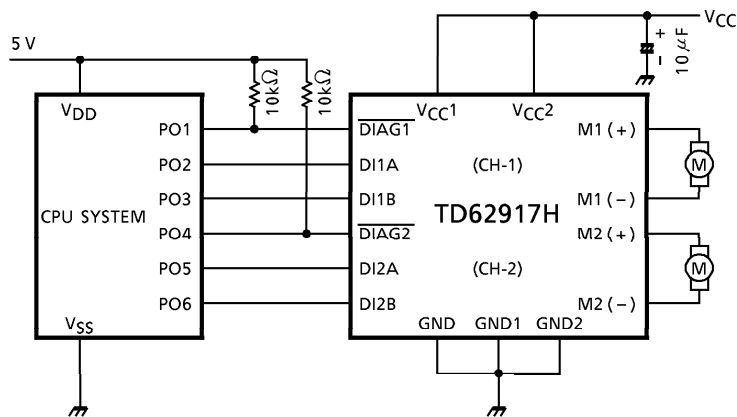
The output current is detected by monitoring the sense resistance. One detection circuit connects to one of the circuits (CH1 or CH2) and leads to the short-circuit protection circuit. When a current exceeding the I_{SD} detection current flows through one of the four output transistors, the short-circuit protection circuit is activated. This circuit contains a timer. When over-current condition continues for $10 \mu s$ (typically), the protection circuit places the output in high-impedance mode and, $290 \mu s$ (typically) later, returns the IC to ON mode. The switching-waveform output is repeated until over-current condition is no longer present.

- Caution for application

The overcurrent protection is used to protect the IC from instantaneous destruction due to short circuits. If overcurrent continues, configure a system which changes the IC to standby mode using the self diagnosis signal.

Note that the time required for switching the IC from output short (overcurrent detection) to standby must be 1 s or less.

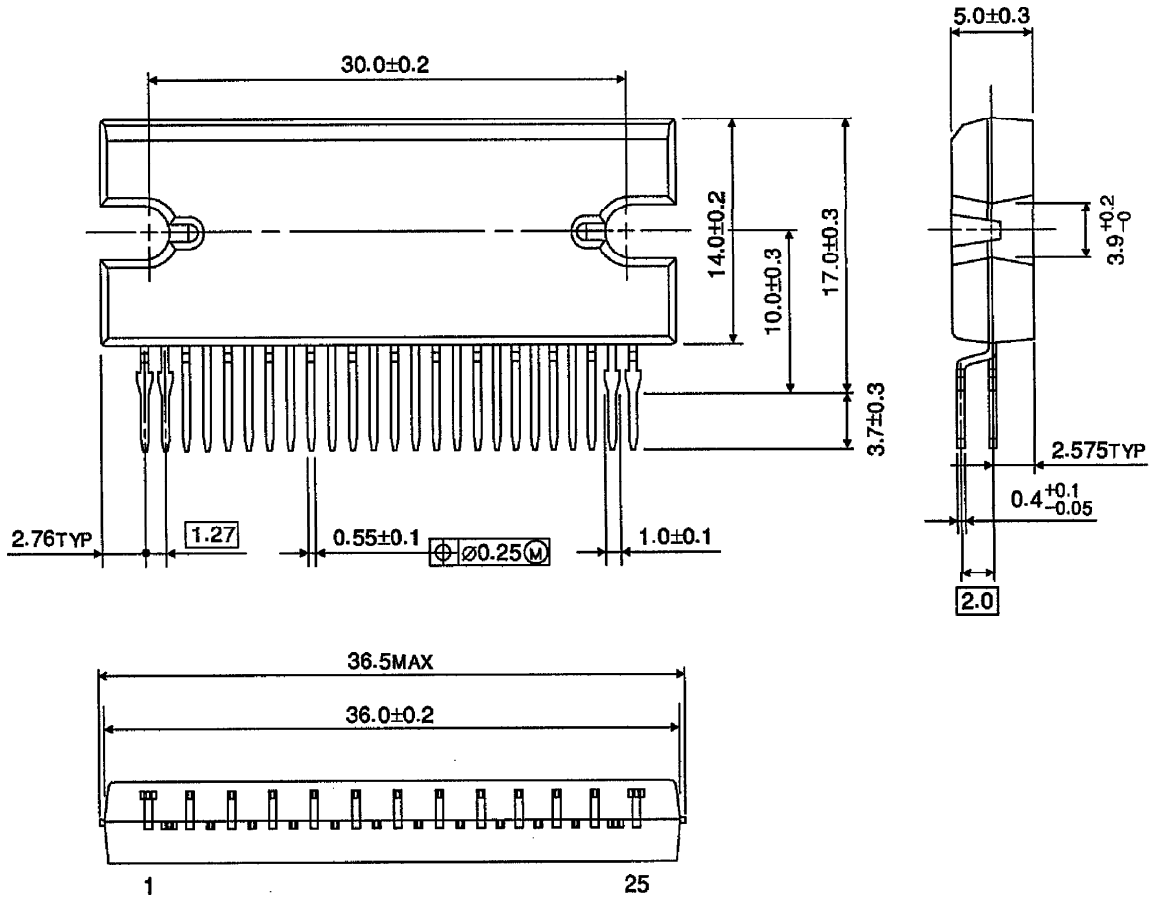
EXAMPLE OF APPLICATION CIRCUIT



- (*) Cautions for wirings
 C₁ is for absorbing disturbance, noise, etc. Connect it as close to the IC as possible.

PACKAGE DIMENSIONS
HZIP25-P-1.27

Unit : mm



Weight : 5.7 g (Typ.)

RESTRICTIONS ON PRODUCT USE

000707EBA

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