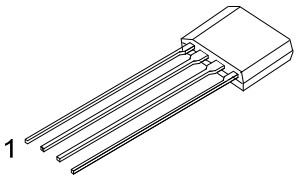
UH477

LINEAR INTEGRATED CIRCUIT

SINGLE PHASE DC MOTOR DRIVE IC



SIP-4

■ DESCRIPTION

The UTC **UH477** is particularly designed for a single phase DC motor driver circuit. It includes hall sensor and output coil drivers. The range of the operating voltage and the operation current is typically 0.3A.

The UTC **UH477** is a well performance integrated IC with less required external components. The high sensitivity of Hall effect sensor is suitable for motors from mini-type CPU coolers to blowers and DC fans.

■ FEATURES

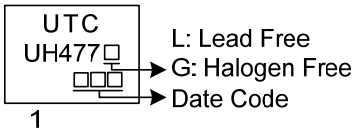
* Operating Voltage Ranges Widely from 3.0V to 20V
* 1 Chip Hall Sensor/Drivers
* Output Thermal Shutdown Protect Circuit
* Output Sink Current up to 300mA

■ ORDERING INFORMATION

Ordering Number		Package	Packing
Lead Free	Halogen Free		
UH477L-G04-K	UH477G-G04-K	SIP-4	Bulk

UH477G-G04-K (1)Packing Type (2)Package Type (3)Green Package	(1) K: Bulk (2) G04: SIP-4 (3) G: Halogen Free and Lead Free, L: Lead Free

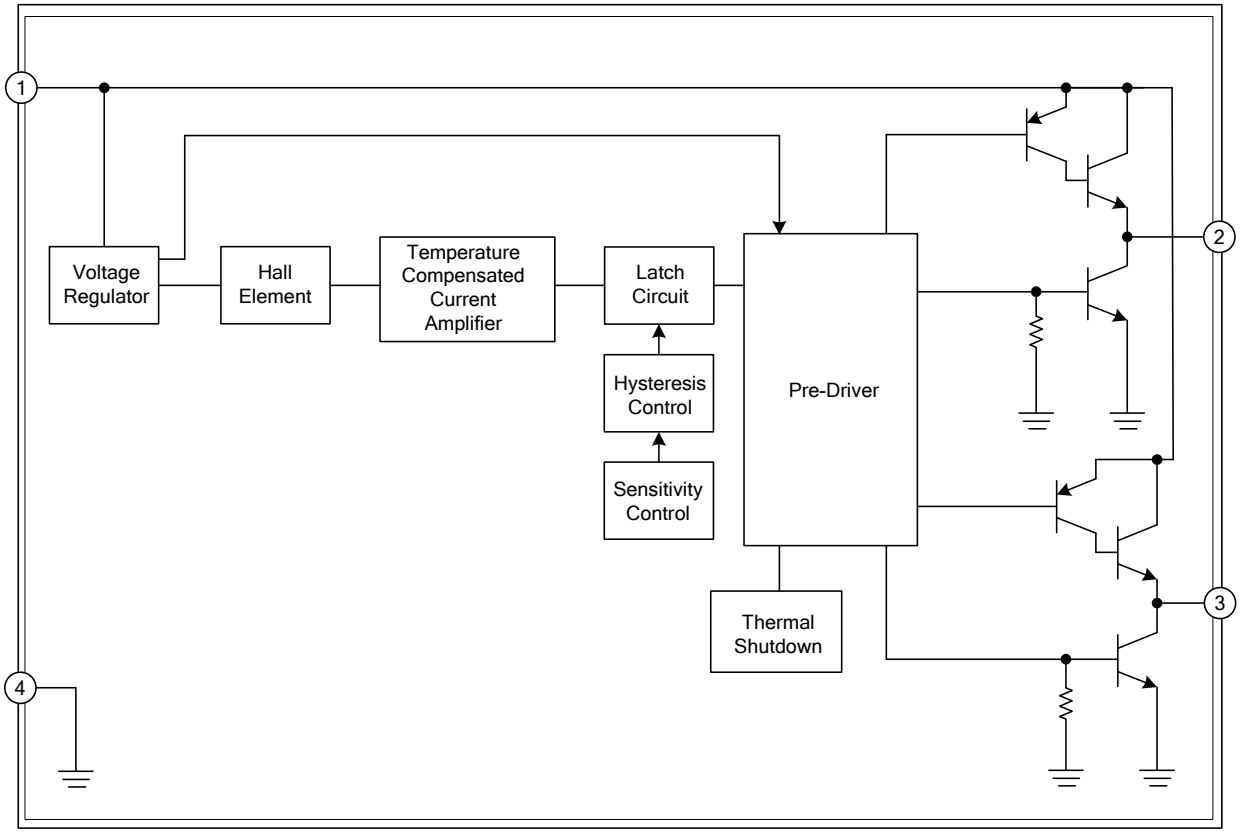
■ MARKING



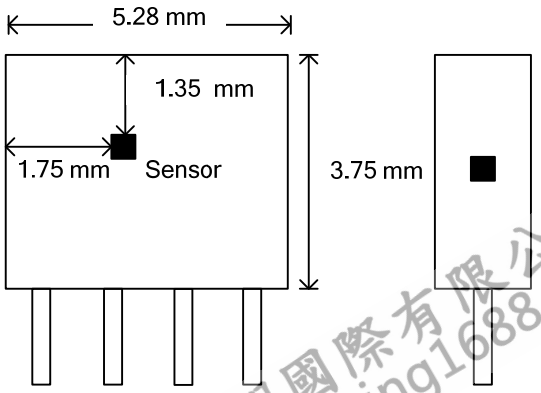
■ PIN DESCRIPTION

PIN NO.	PIN NAME	DESCRIPTION
1	V_{CC}	IC Power Supply
2	NO	Coil driver output is low state during the N magnetic field.
3	SO	Coil driver output is low state during the S magnetic field.
4	GND	IC Ground

■ BLOCK DIAGRAM



■ SENSOR LOCATIONS



■ ABSOLUTE MAXIMUM RATING

PARAMETER		SYMBOL	RATINGS	UNIT
V_{CC} Pin Voltage		V_{CC}	20	V
Output Peak Sink Current	Peak Current	I_{OUT}	700	mA
	Hold Current		400	mA
	Continuous Current		300	mA
Power Dissipation	T_A=25°C	P_D	600	mW
	T_A=70°C		450	mW
Junction Temperature		T_J	+150	°C
Operating Junction Temperature		T_J	0 ~ +85	°C
Storage Temperature		T_{STG}	-65 ~ +150	°C

Note: Absolute maximum ratings are those values beyond which the device could be permanently damaged. Absolute maximum ratings are stress ratings only and functional device operation is not implied.

■ DC ELECTRICAL CHARACTERISTICS

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Supply Voltage	V_{CC}		3		20	V
Quiescent Supply Current	I_{CC}	V_{CC}=20V, No use pin open		25	30	mA
Output Saturation Voltage	$V_{CE(SINK)}$	V_{CC}=14V, I_C=200mA		0.55	0.8	V
	$V_{CE(DRIVE)}$	V_{CC}=14V, I_C=200mA	12.5		14	V

■ AC ELECTRICAL CHARACTERISTICS

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Rise Time	t_R	R_L=820Ω, C_L=20pF		0.5	1.0	μs
Fall Time	t_F	R_L=820Ω, C_L=20pF		0.5	1.5	μs
Switch Time Differential	Δt	R_L=820Ω, C_L=20pF		1.0	0.5	μs

■ MAGNETIC CHARACTERITICS

A Grade

PARAMETER	SYMBOL	MIN	TYP	MAX	UNIT
Operating Point	B_{OP}			45	Gauss
Release Point	B_{RP}	-45			

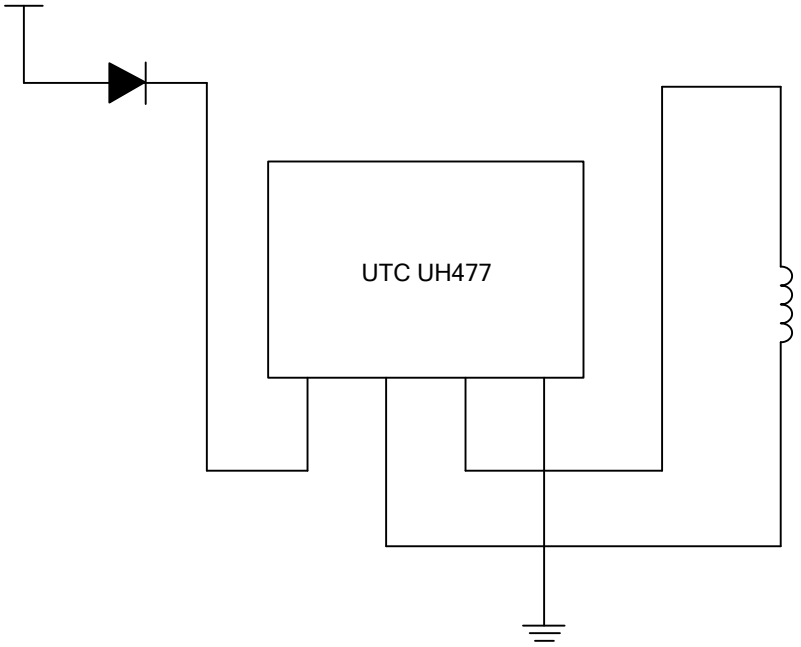
B Grade

PARAMETER	SYMBOL	MIN	TYP	MAX	UNIT
Operating Point	B_{OP}			65	Gauss
Release Point	B_{RP}	-65			

C Grade

PARAMETER	SYMBOL	MIN	TYP	MAX	UNIT
Operating Point	B_{OP}			90	Gauss
Release Point	B_{RP}	-90			

■ TYPICAL APPLICATION CIRCUIT



■ APPLICATION CIRCUIT

The Example of Typical Application Circuit

A typical application circuit is shown as follows. The red, yellow, and black wires are the input points of the motor system: Red--the input of power supply; Yellow--the output of FG; Black--the ground signal. R_C is an external pull-up resistance for the use of measuring FG signal.

The value of R_C can be calculated by the transistor saturation voltage (V_{ON}), sink current (I_C), and off-level voltage (V_C).

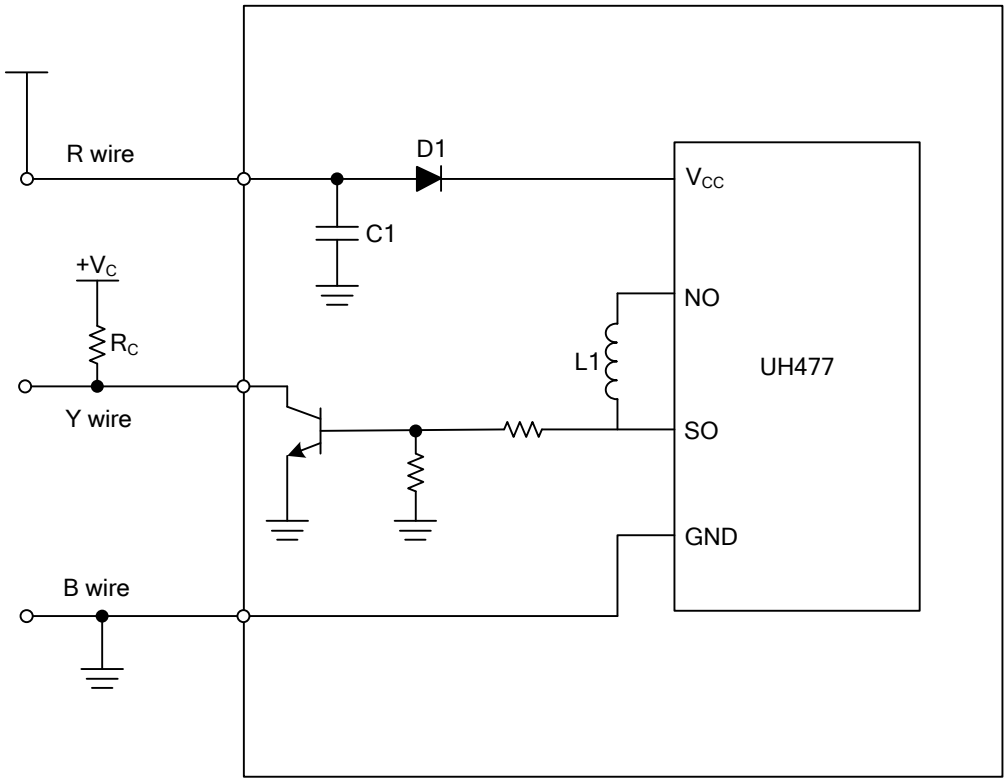
$$R_C = \frac{V_C - V_{ON}}{I_C}$$

For example:

V_C=+5V for TTL level; I_C= 10mA at 0.2V saturation voltage; The safety value of R_C=470 Ω

There is a reverse protection diode D1 in the circuit. As if the red and black wires reversely connect with the power source, the current flows through the ground via IC and coils L1 and L2 to power supply. Under such kind of circumstances the IC and coils are easy to be burned out. From that, this reverse protection diode is necessary in the design. Meanwhile, an extra voltage drop on the supply voltage should be taken into consideration, which is caused by the reverse protection diode.

The capacitor C1 is designed to reduce the ripple noise during the transient of the output stages, and its value is determined by the coil impedance and characteristics.



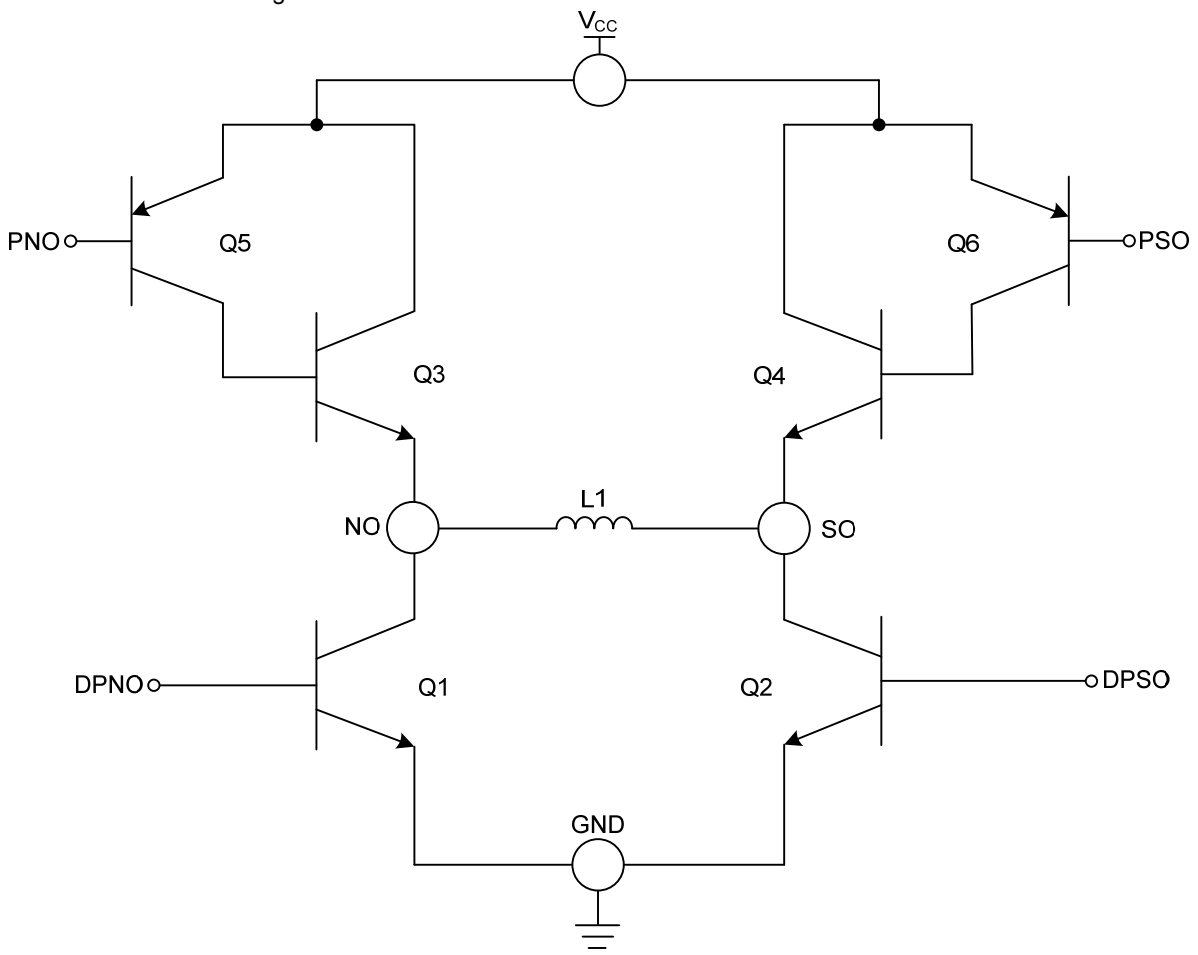
■ FUNCTIONAL INFORMATION

H-Bridge Transistor Output

In the following figure, the diagram of H-bridge transistors is shown. The single-phase motor rotation is changed by a switching current of coil L1.

When the magnetic pole is N pole, Q2, Q3, Q5 is shut off and Q1, Q4, Q6 is turn-on, the current flows through L1 from SO to NO. And when the magnetic pole is S pole, Q1, Q4, Q6 is turn-off and Q2, Q3 is turned on.

The current flows through L1 from NO to SO.



H-Bridge Transistor Output