



319

Preliminary

LINEAR INTEGRATED CIRCUIT

SINGLE PHASE DC MOTOR DRIVE IC

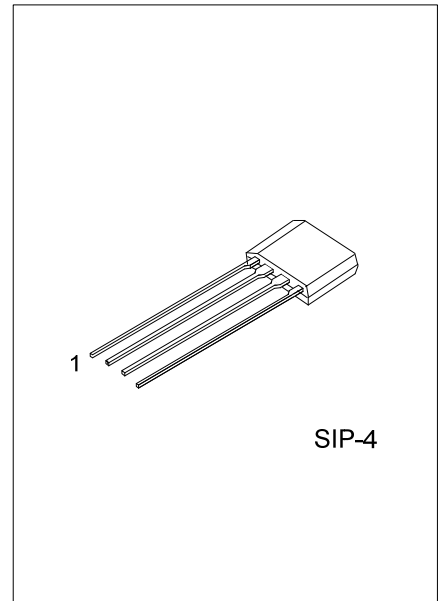
DESCRIPTION

The UTC 319 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 319 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

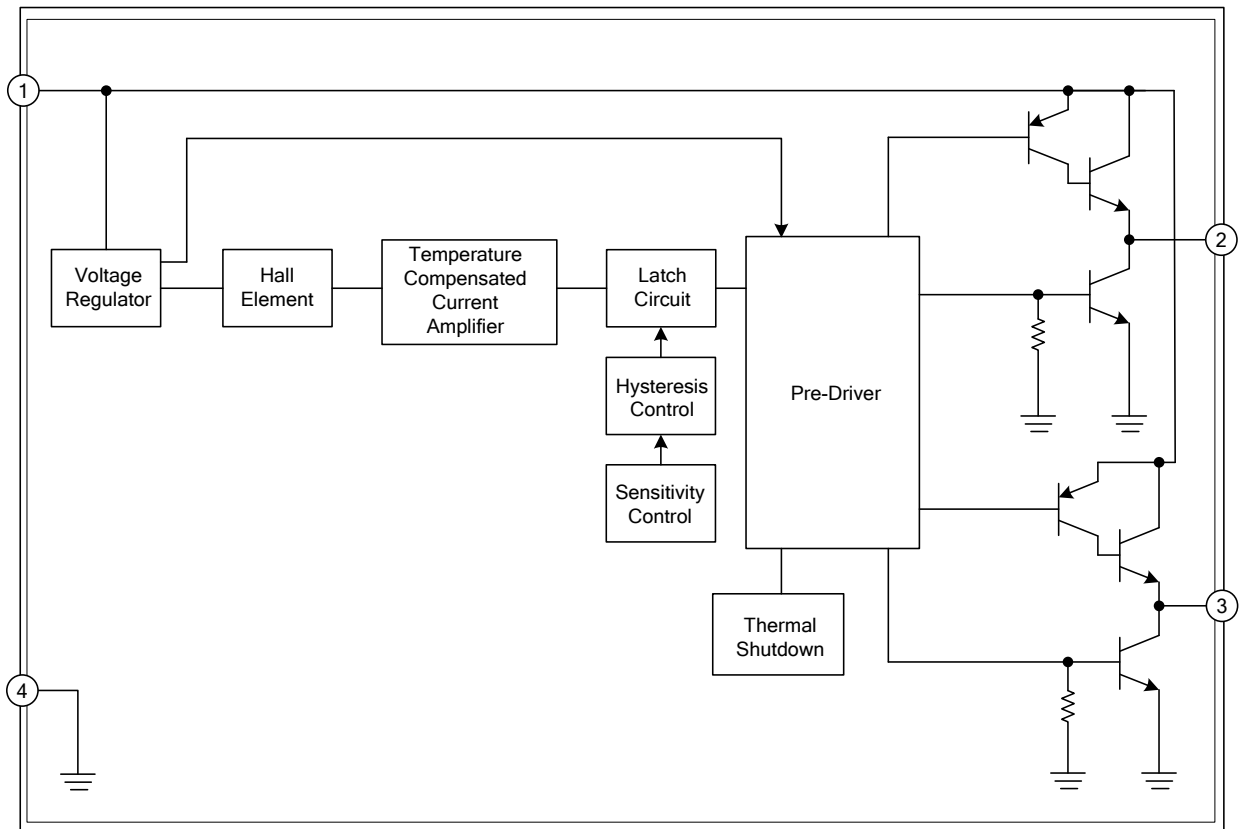
| Ordering Number | | Package | Packing |
|-----------------|--------------|---------|---------|
| Lead Free | Halogen Free | | |
| 319L-G04-K | 319G-G04-K | SIP-4 | Bulk |

| | |
|--|---|
| <p>319G-G04-T</p> <p>(1)Packing Type (2)Package Type (3)Halogen Free</p> | <p>(1) K: Bulk (2) G04: SIP-4 (3) G: Halogen Free, L: Lead Free</p> |
|--|---|

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



■ ABSOLUTE MAXIMUM RATING

| PARAMETER | | SYMBOL | RATINGS | UNIT |
|--------------------------------|----------------------|------------------|------------|------|
| V _{CC} Pin Voltage | | | 20 | V |
| Output Peak Sink Current | Peak Current | I _{OUT} | 800 | mA |
| | Hold Current | | 600 | 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 Range | | 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 _{VV} | V _{CC} =20V, No use pin open | | 18 | 25 | 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 | V _{CC} =1.5 | | V _{CC} | 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 CHARACTERISTICS

A Grade

| PARAMETER | SYMBOL | MIN | TYP | MAX | UNIT |
|-----------------|-----------------|-----|-----|-----|-------|
| Operating Point | B _{OP} | 10 | | 45 | Gauss |
| Release Point | B _{RP} | -45 | | -10 | |

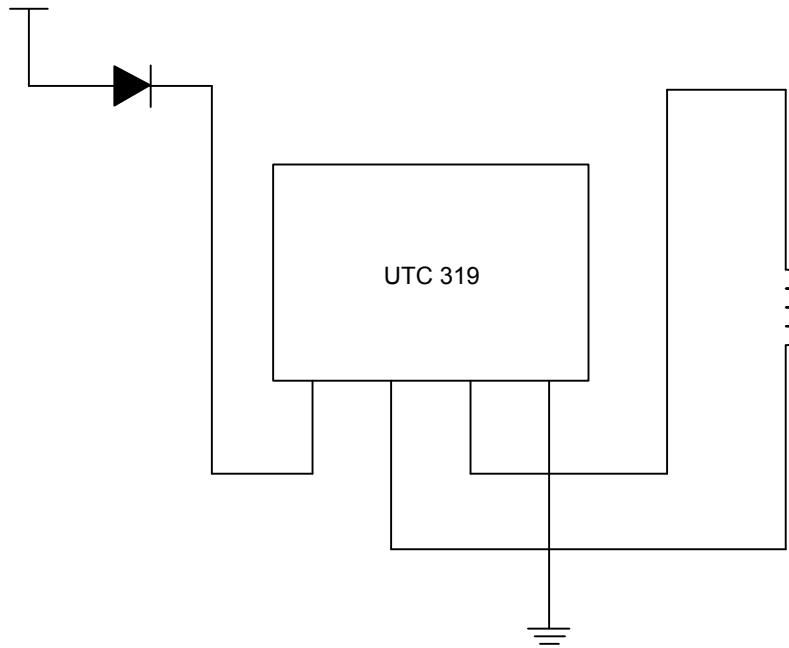
B Grade

| 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).

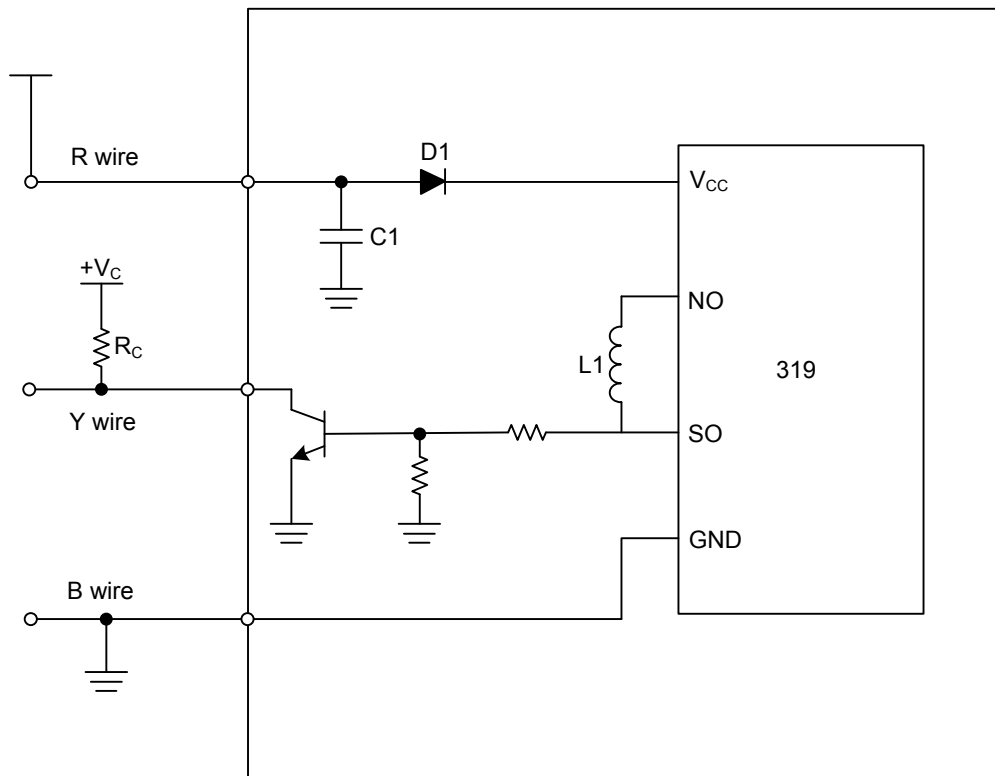
$$R_C = \frac{V_C - V_{ON}}{I_C}$$

For example:

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

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.

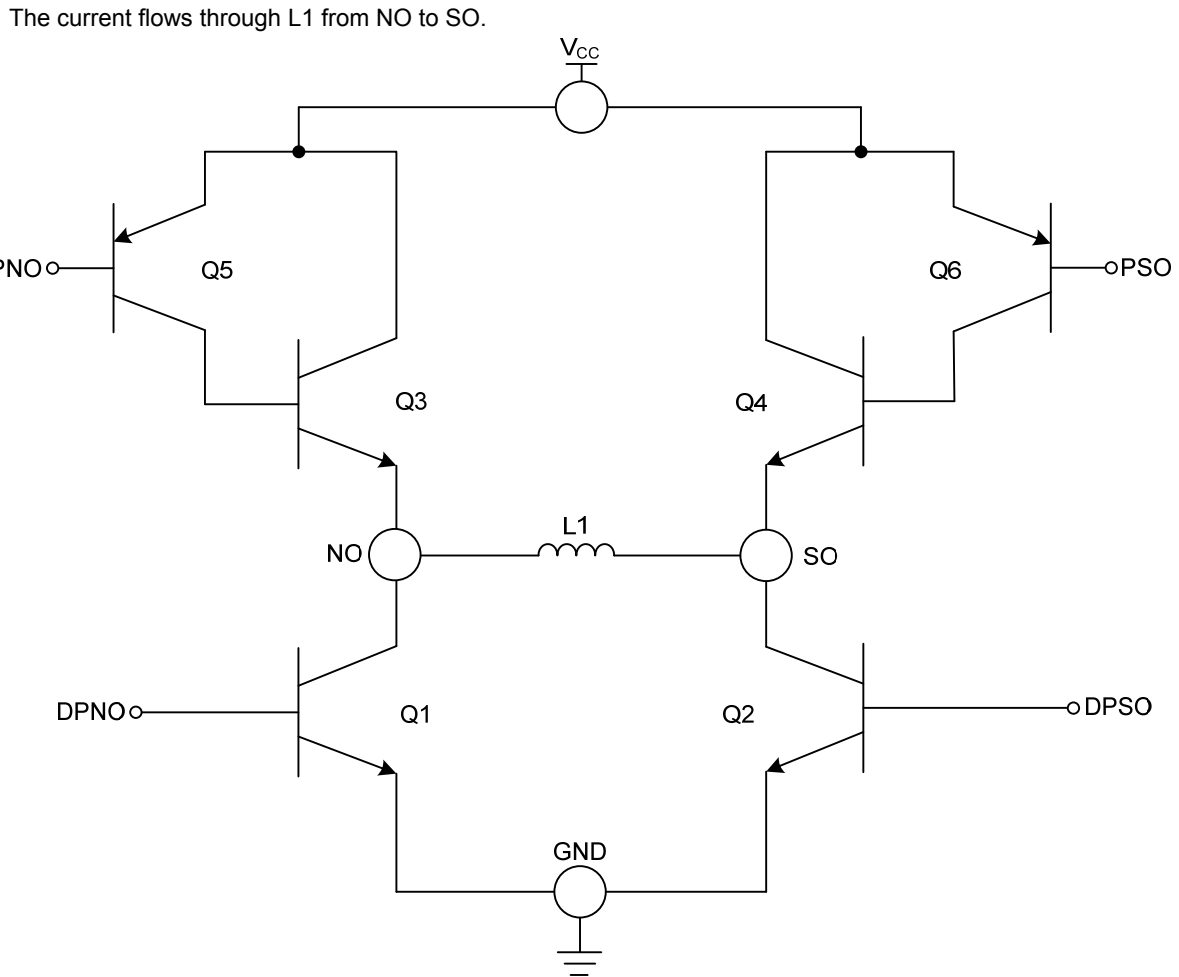


FUNCTIONAL INFORMATION

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.



H-Bridge Transistor Output

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