Ordering number : ENA2142

# LB11668MC

ON Semiconductor®

http://onsemi.com

**Monolithic Digital IC**

## For Fan Motor

## Two-Phase Half-Wave Driver

### Overview

The LB11668MC is a two-phase uni-polar brushless motor driver for fan motor.

### Functions

- Two-phase half-wave drive.
- RD (lock detection) outputs incorporated.
- FG (rotation detection) outputs incorporated.
- Thermal shutdown circuit incorporated.
- Lock protection and automatic return function incorporated.
- Output protection zener diode incorporated.
- Hall input amplifier incorporated.

### Specifications

**Absolute Maximum Ratings** at Ta = 25°C

| Parameter | Symbol | Conditions | Ratings | Unit |
|---|---|---|---|---|
| Maximum inflow current | $I_{IN}$ max | | 100 | mA |
| Output current | $I_{OUT}$ ave | | 400 | mA |
| | $I_{OUT}$ peak | | 800 | mA |
| Output withstand voltage | $V_{OUT}$ max | | Internal | V |
| RD output current | $I_{RD}$ max | | 10 | mA |
| RD output withstand voltage | $V_{RD}$ max | | 28 | V |
| Allowable dissipation | Pd max | Mounted on a board * | 750 | mW |
| Operating temperature | Topr | | -30 to +85 | °C |
| Storage temperature | Tstg | | -55 to +150 | °C |

* Specified board : 114.3mm × 76.1mm × 1.5mm, glass epoxy board.

Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

## Recommended Operating Conditions at Ta = 25°C

| Parameter | Symbol | Conditions | Ratings | Unit |
|---|---|---|---|---|
| Inflow current range | $I_{IN}1$ | | 5 to 25 | mA |
| Common-mode input voltage range | VCOM | | 0.2 to $V_{IN}$ -2.3 | V |

## Electrical Characteristics at Ta = 25°C, $V_{CC}$ = 24V, R1 = 1kΩ, unless otherwise specified.

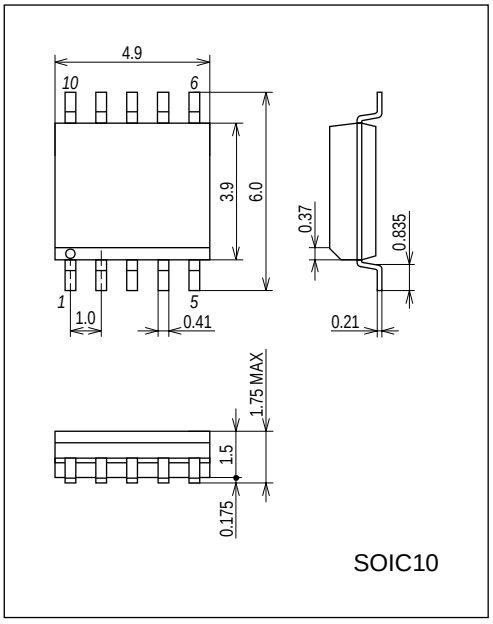
| Parameter | Symbol | Conditions | Ratings | | | Unit |
|---|---|---|---|---|---|---|
| | | | min | typ | max | |
| $V_{IN}$ voltage | $V_{IN}$ | $I_{IN}$ = 6mA | 6.9 | 7.2 | 7.6 | V |
| CT capacitor charging current | $I_{CT}1$ | CT = 0V | 0.8 | 1.2 | 2.0 | μA |
| Capacitor discharging current | $I_{CT}2$ | CT = 6.0V | 0.12 | 0.24 | 0.4 | μA |
| Capacitor charging/ discharging current ratio | $R_{CT}$ | $R_{CT} = I_{CT}1 / I_{CT}2$ | 4.0 | 5.0 | 7.0 | |
| CT charging voltage | $V_{CT}H$ | $V_{CT}/V_{IN}$ | 66 | 70 | 74 | % |
| CT discharging voltage | $V_{CT}L$ | $V_{CT}/V_{IN}$ | 36 | 40 | 44 | % |
| Output limit withstand voltage | $V_O$LM | $I_O$ = 10mA | 50 | 53 | 56 | V |
| Output saturation voltage | $V_O$L1 | $I_O$ = 200mA | | 0.85 | 1.1 | V |
| Hall input sensitivity | $V_{HN}$ | Including offset and hysteresis | | 8 | 18 | mV |
| RD output saturation voltage | $V_{RD}$ | $I_{RD}$ = 5mA | | 0.2 | 0.5 | V |
| RD output leak current | $I_{RD}$ | $V_{RD}$ = 14V | | 0.1 | 10 | μA |
| Thermal protection function operating temperature | VTH | Design target value * | 150 | 180 | 210 | °C |

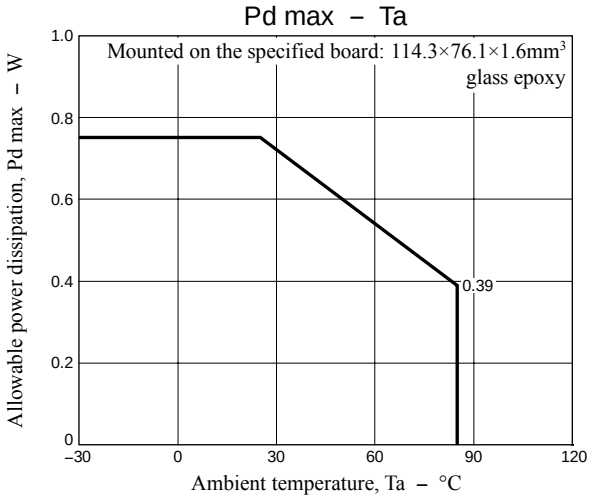
* "Design" is a design target and is not measured.

## Package Dimensions

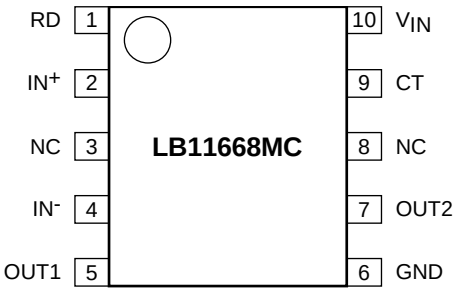
unit : mm (typ)

3426A



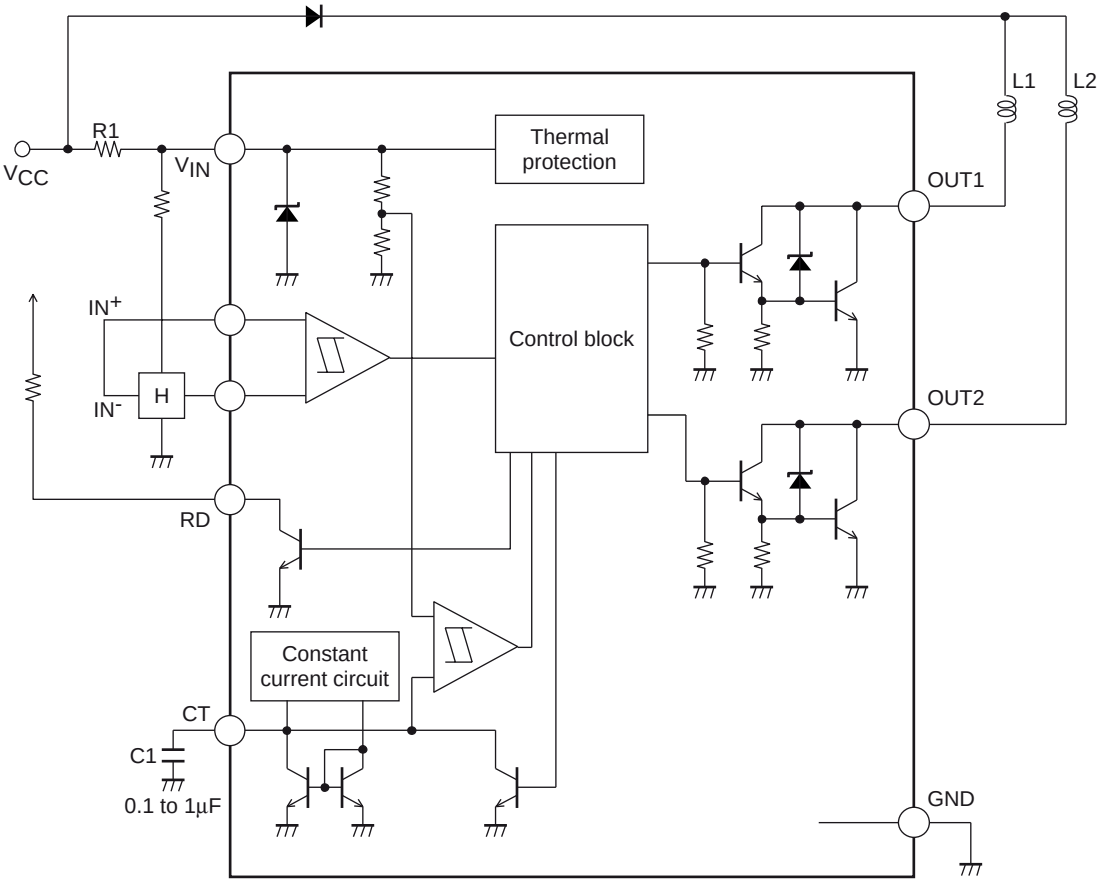



## Pin Assignment




Top view

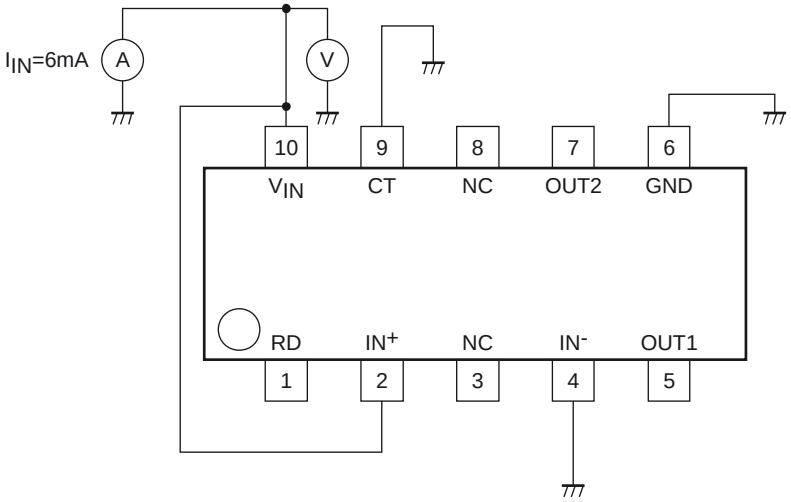
## Block Diagram



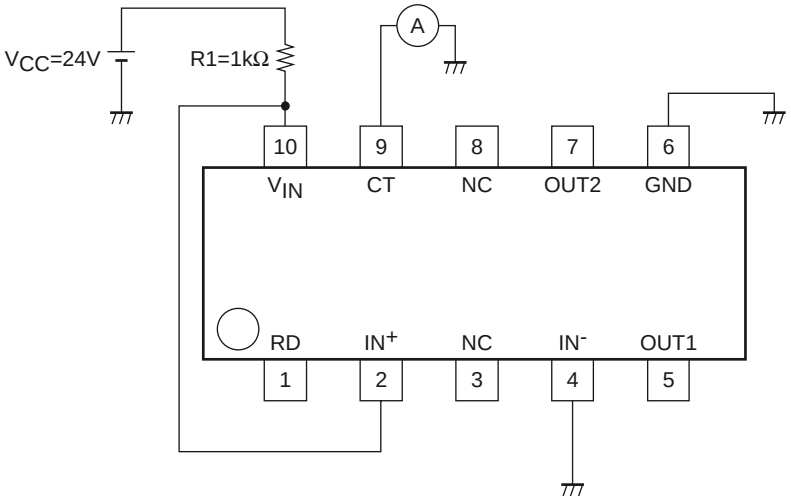

## Truth table

| IN- | IN+ | CT | OUT1 | OUT2 | RD | Mode |
|---|---|---|---|---|---|---|
| H | L | L | L | H | L | Rotation |
| L | H | | H | L | | |
| - | - | H | OFF | OFF | H | Lock protection |

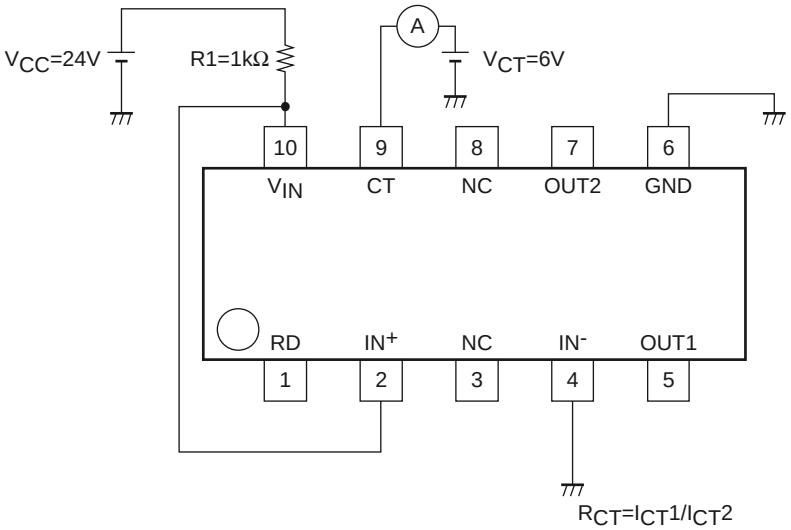
$V_{IN}1$



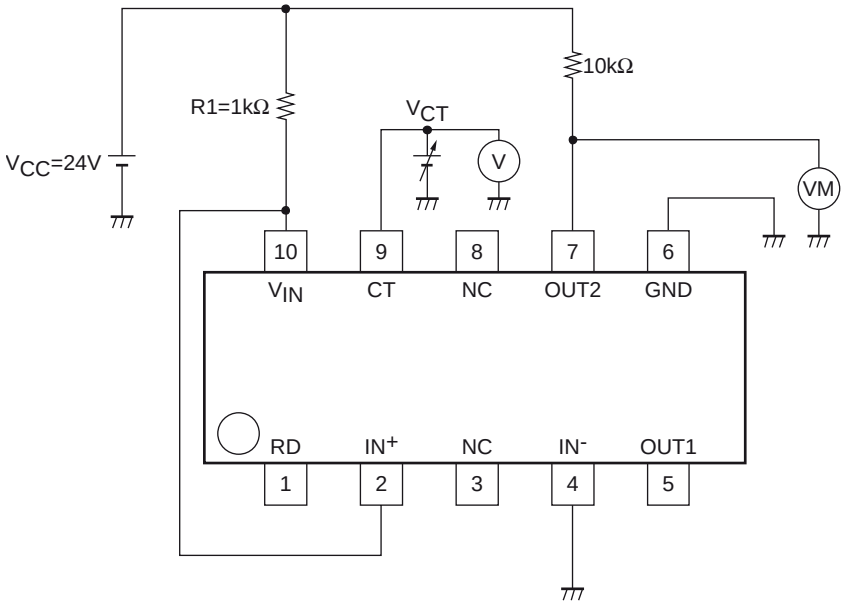

$I_{CT}1$



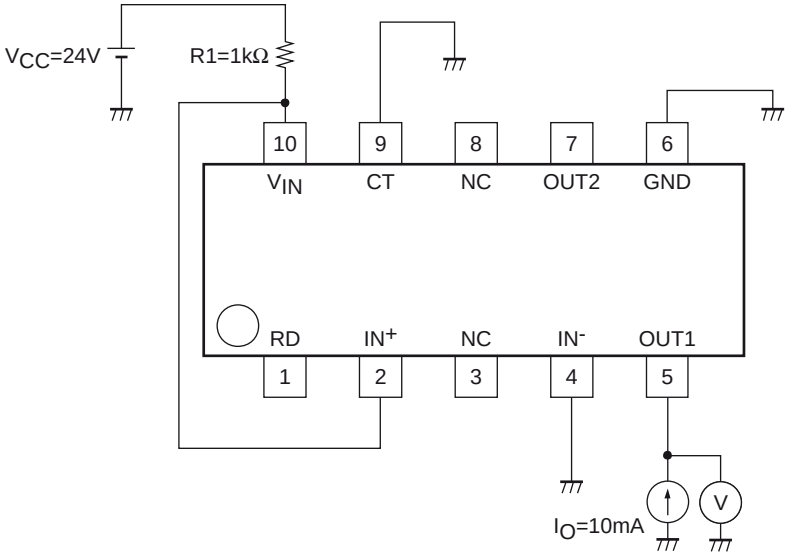

$I_{CT}2$



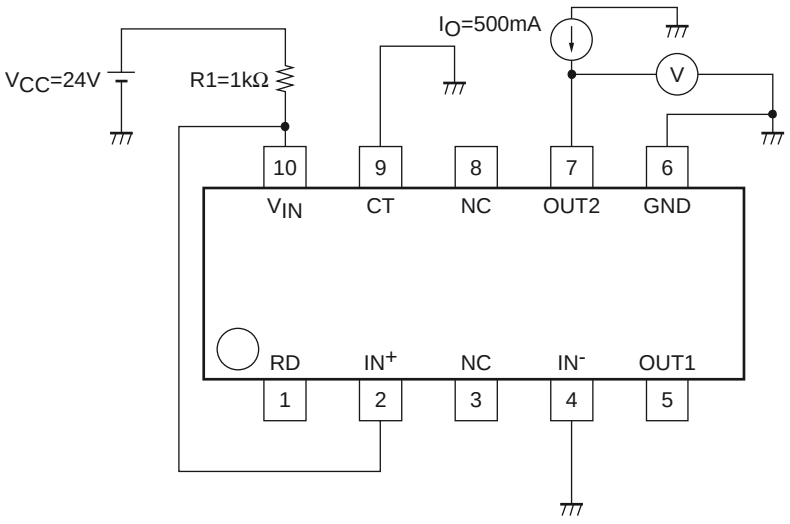
$V_{CT}H$, $V_{CT}L$



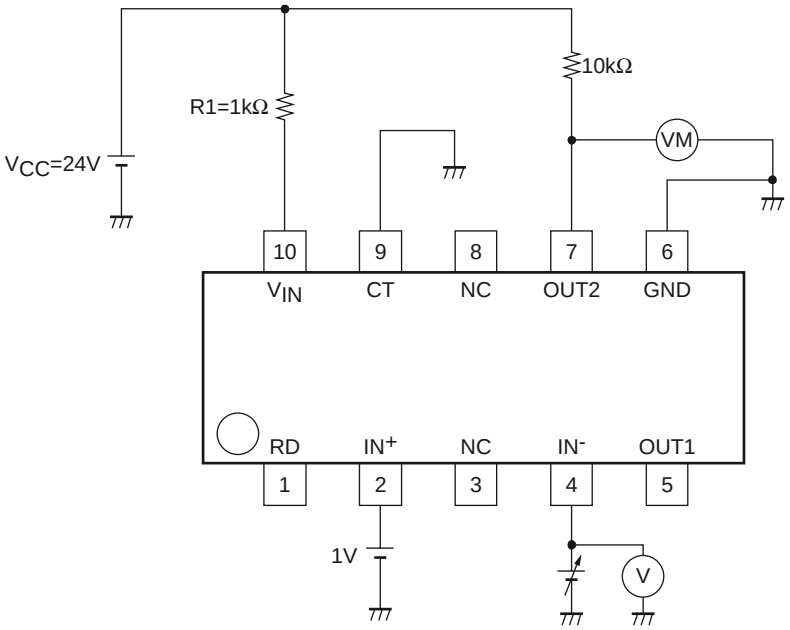

$V_O$LM



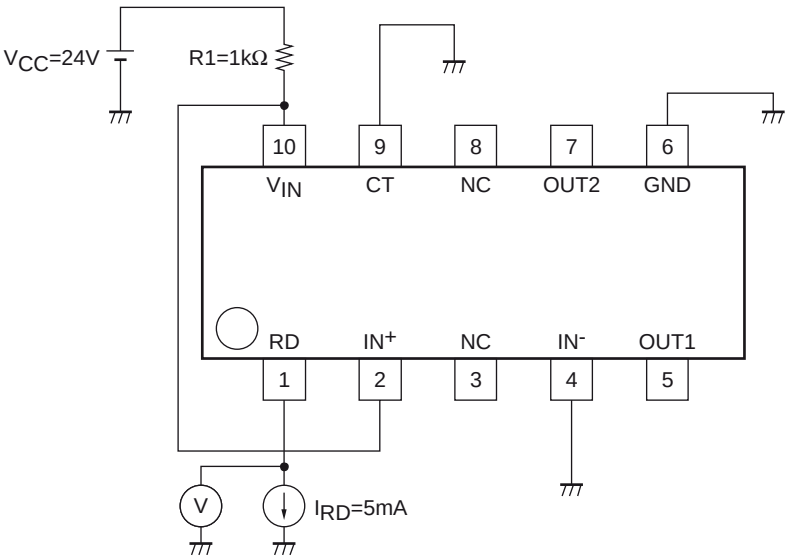

$V_O$L1



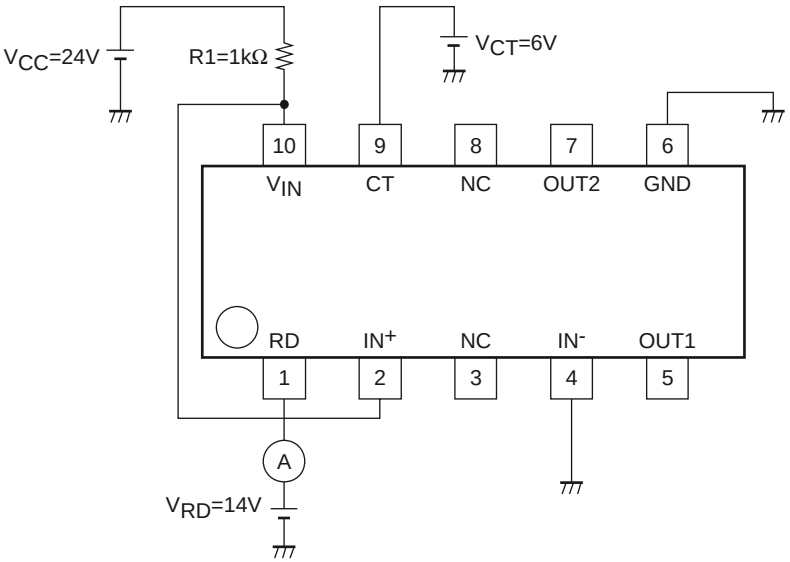
$V_{HN}$



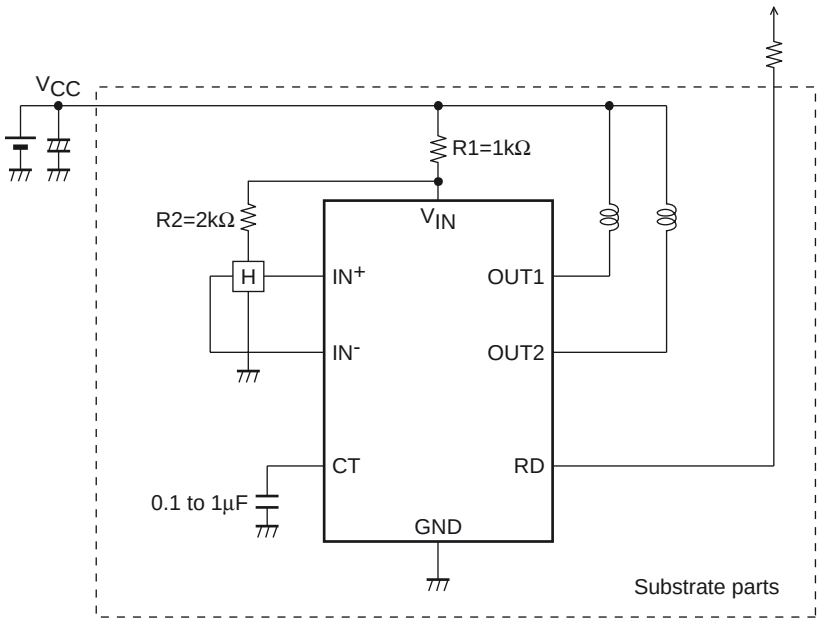

$V_{RD}$




$V_{RL}$



## Application Circuit Example 24V power supply




## Notice

- Take care not to cause interference due to wiring of $IN^-$ and OUT1.
- In an application of connecting the CT pin to GND, lock protection and restart function are not effective.
- With reverse power - GND connection in the above application figure, the current restricted by the coil resistance flows from GND → OUT → coil → power supply. IC breakage does not occur if the current value is 500mA or less. If necessary, insert Di between $V_{CC}$ and coil.