## Description

The ME1277, a monolithic integrated circuit composed of hall sensor and output coil drivers, is designed for 2-phase DC motor. The high sensitivity of Hall Effect sensor is suitable for motors from mini-type CPU coolers to blowers and DC fans. Typical operation current is 0.3A and operating voltage range is as low as 3.5 volts.

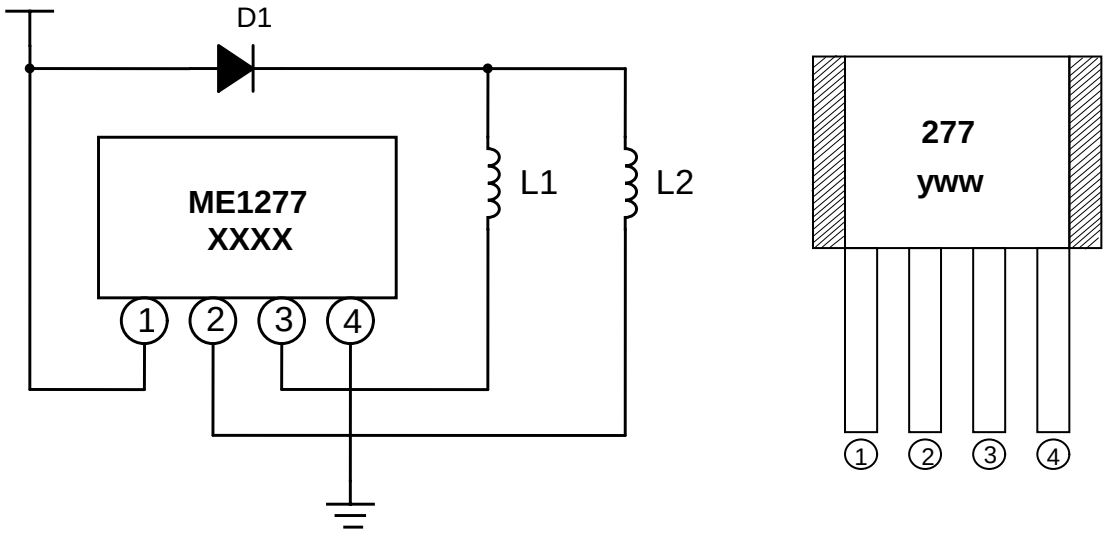
## Features

- Wide operating voltage range: 3.5V~20V
- High reliability
- Small size
- Output compatible with all digital logic families
- Reverse voltage protection

## Applications

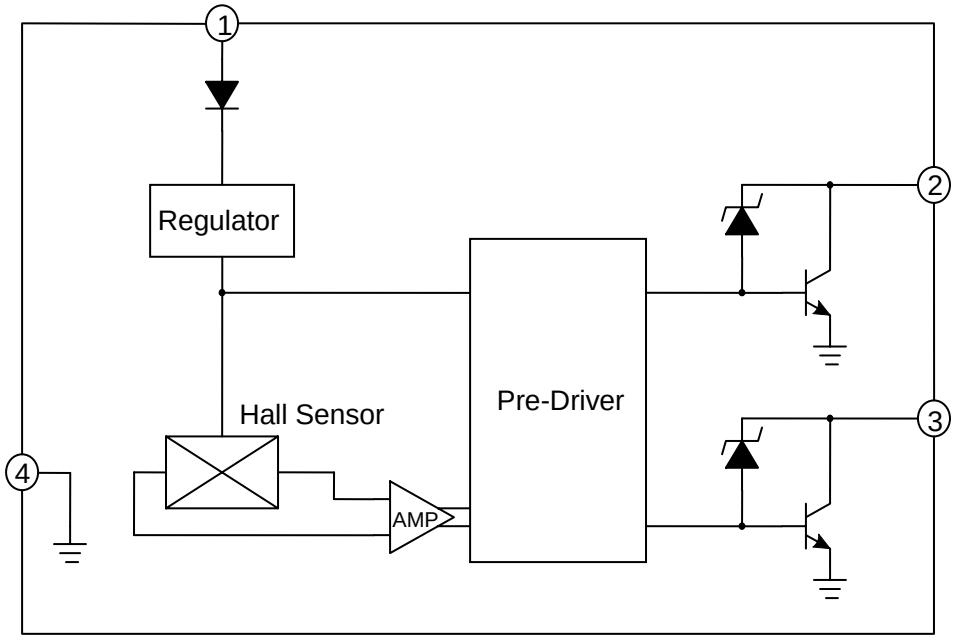
- Brushless DC motor
- Rotation detection
- Displacement detection
- Speed sensing

## Typical Application Circuit




| Name | No. | Status | Function |
|---|---|---|---|
| $V_{CC}$ | 1 | P | Power Supply |
| DO | 2 | O | Coil driver output |
| DOB | 3 | O | Coil driver output |
| GND | 4 | P | IC Ground |

## Functional Block Diagram




## Absolute Maximum Ratings

| Parameter | Value | Units |
|---|---|---|
| Zener Breakdown Voltage ($V_Z$) | 57 | V |
| Supply Voltage ($V_{CC}$) | 30 | V |
| Reverse Supply Voltage | -35 | V |
| Continuous Output Current (Icontinuous) | 300 | mA |

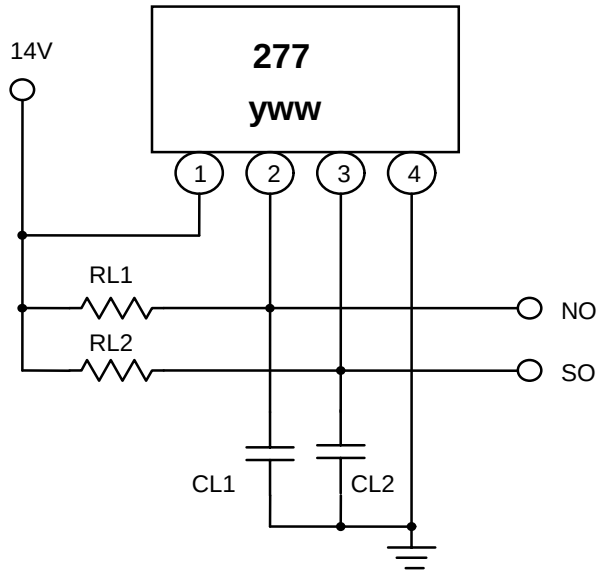
| | | |
|---|---|---|
| Hold Output Current | 400 | mA |
| Peak Current (Start up) | 700 | mA |
| Maximum Power Dissipation | 550 | mA |
| Operating Temperature Range | -20 ~ 85 | ℃ |
| Storage Temperature Range | -65 ~ 150 | ℃ |
| Junction Temperature | 150 | ℃ |
| Lead Temperature (soldering, 10 seconds) | 230 | ℃ |

**Note:** Exceeding the absolute maximum ratings may cause permanent damage. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.

## DC Electrical Specifications

| Parameter | Test Conditions | Min | Typ | Max | Units |
|---|---|---|---|---|---|
| Operating Voltage | | 3.5 | | 20 | V |
| Supply Current | $V_{CC}$: 3 ~ 20V | | 15 | 25 | mA |
| NO / SO Saturation Voltage | $I_O$ = 300mA | | 0.3 | 0.6 | V |
| Output Leakage Current | $V_{CC}$ = 14V | | < 0.1 | 10 | μA |
| Output Rise Time | $V_{CC}$=14V<br>$R_L$=820<br>$C_L$=20pF | | 3 | 10 | μS |
| Output Fall Time | | | 0.3 | 1.5 | μS |

## Test Circuit

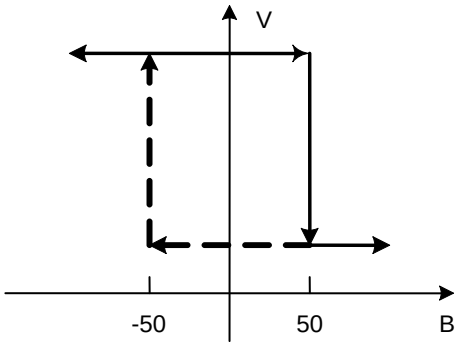


## Magnetic Specifications

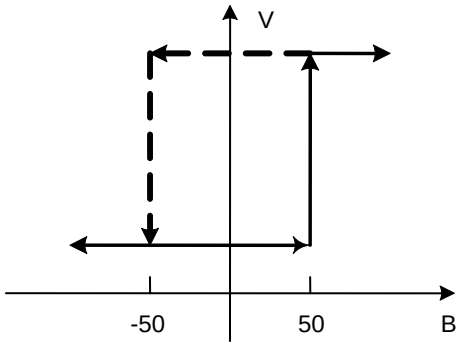
| ME1277-A | | $T_A$=-40℃~105℃ | | | |
|---|---|---|---|---|---|
| **Parameter** | **Symbol** | **Min** | **Typ** | **Max** | **Unit** |
| Operating Point | $B_{OP}$ | 10 | - | 50 | Gs |
| Release Point | $B_{RP}$ | -50 | - | -10 | Gs |
| Hysteresis | $B_{HYS}$ | 40 | 70 | 100 | Gs |

| ME1277-B | | $T_A$=-40℃~105℃ | | | |
|---|---|---|---|---|---|
| **Parameter** | **Symbol** | **Min** | **Typ** | **Max** | **Unit** |
| Operating Point | $B_{OP}$ | - | - | 70 | Gs |
| Release Point | $B_{RP}$ | -70 | - | - | Gs |
| Hysteresis | $B_{HYS}$ | 40 | 70 | 100 | Gs |

| ME1277-C | | $T_A$=-40℃~105℃ | | | |
|---|---|---|---|---|---|
| **Parameter** | **Symbol** | **Min** | **Typ** | **Max** | **Unit** |
| Operating Point | $B_{OP}$ | | | 90 | Gs |
| Release Point | $B_{RP}$ | -90 | | | Gs |
| Hysteresis | $B_{HYS}$ | 40 | 70 | 100 | Gs |




NO PIN

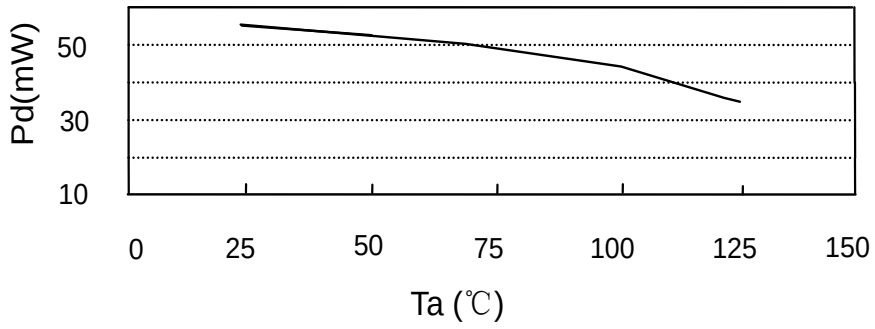



SO PIN

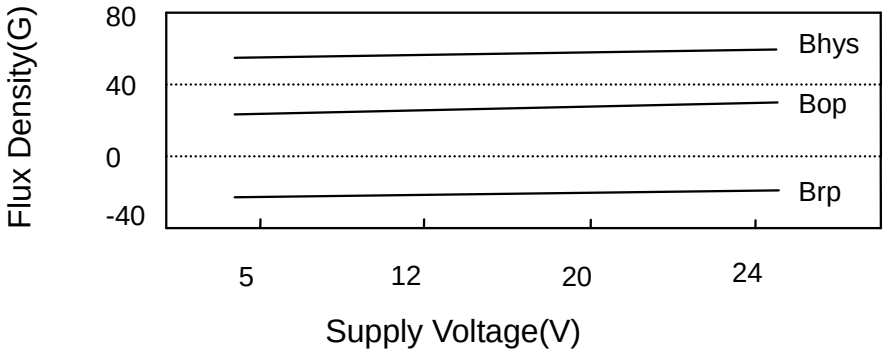
## Performance Characteristics

| $T_A$ | 25 | 50 | 60 | 70 | 80 | 85 | 90 | 95 | 100 | 105 | 110 | 115 | 120 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $P_D$(mW) | 550 | 525 | 515 | 505 | 485 | 475 | 465 | 455 | 445 | 425 | 405 | 385 | 365 |

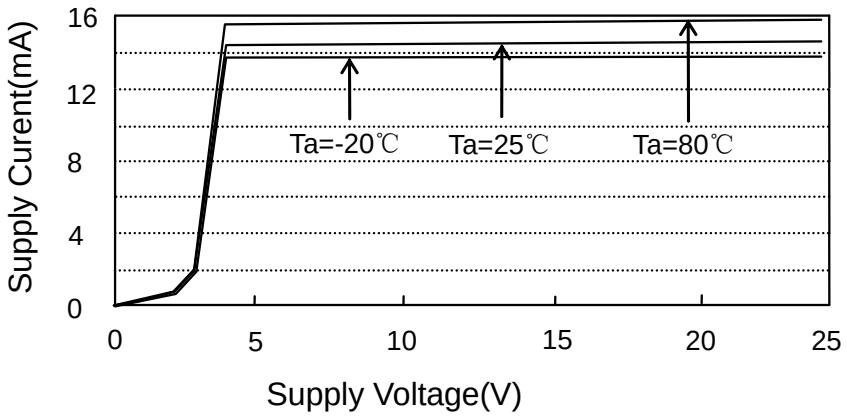
**Power Dissipation Curve**




**Typical Magnetic Swith Point VS Supply Voltage**

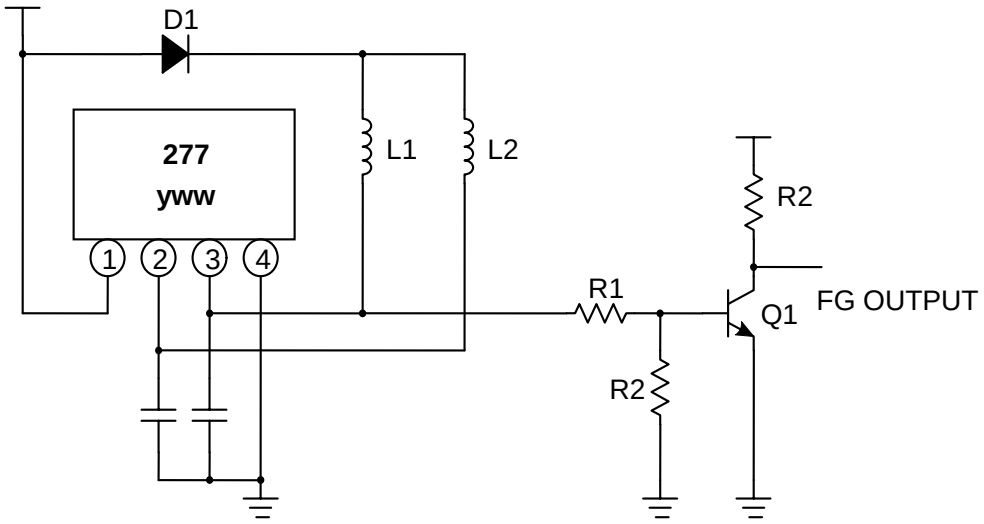



**Typical Supply Current versus Supply Voltage**



## Applications Information

Shown in the following figure is the typical application with reverse voltage protection and frequency generation (FG) output signal.




The diode D1 functions as reverse voltage protection circuitry. L1 and L2 represent the coils of the fan. R1, R2 and Q1 form the circuit to produce frequency generation signal, FG. The pull-up resistor of the OC output stage, R3, is usually not built on board.

The protection diode built in ME1277 can only protect the integrated circuit on chip side but not on coils side. On case of reverse power connection, the built-in protection diode at $V_{CC}$ will limit the current through $V_{CC}$. But the current through coils L1 and L2 can not be limited by the internal protection diode. This current can be estimated as,

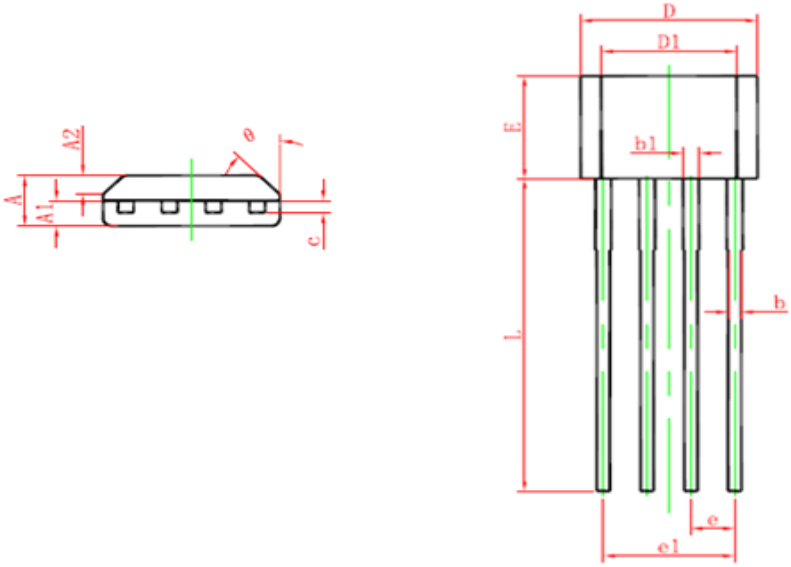
$I = V_{CC} / R_{L1} + V_{CC} / R_{L2}$

When this current exceeds the ratings of the coils, the coils may be burnt out. The IC may also be damaged if the current I exceeds its limit. To prevent the coils-side damage, an external protection diode D1 can be inserted between the power pin $V_{CC}$ and the coils.

R1, R2 and Q1 are used to frequency generation signal. There is no need to assemble them without FG output. R1 and R2 could be the resister with the value of 10kΩ and Q1 could be a normal NPN transistor.

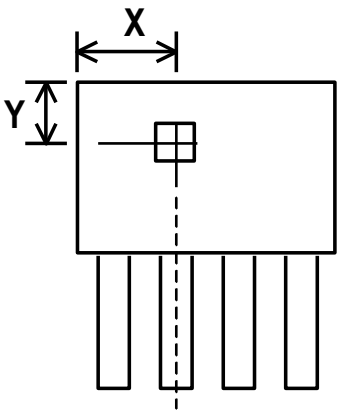
In order to improve the EMC performance of the fan, two grounded 1uF capacitors can be connected at each output (NO and SO).

## Package Outline VK（TO - 94）




| Symbol | Dimensions In Millimeters | | Dimensions In Inches | |
|---|---|---|---|---|
| | Min. | Max. | Min. | Max. |
| A | 1.400 | 1.800 | 0.055 | 0.071 |
| A1 | 0.700 | 0.900 | 0.028 | 0.035 |
| A2 | 0.500 | 0.700 | 0.020 | 0.028 |
| b | 0.360 | 0.500 | 0.014 | 0.020 |
| b1 | 0.380 | 0.550 | 0.015 | 0.022 |
| c | 0.360 | 0.510 | 0.014 | 0.020 |
| D | 4.980 | 5.280 | 0.196 | 0.208 |
| D1 | 3.780 | 4.080 | 0.149 | 0.161 |
| E | 3.450 | 3.750 | 0.136 | 0.148 |
| e | 1.270 TYP. | | 0.050 TYP. | |
| e1 | 3.710 | 3.910 | 0.146 | 0.154 |
| L | 14.900 | 15.300 | 0.587 | 0.602 |
| θ | 45° TYP. | | 45° TYP. | |

**Hall plate location**




| | | unit |
|---|---|---|
| X | 1.75 | mm |
| Y | 1.35 | mm |

## Ordering Information

| Part No. | Package Code |
|---|---|
| ME1477 | VK (TO-94) |