CR211
2PHASE DC MOTOR DRIVER WITH SPEED DETECTION

1. General Description

The CR211, one chip composed of hall sensor and output coil drivers, applied to 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. The device also includes an amplifier that amplifies the Hall voltage, and a Schmitt trigger to provide switching hysteresis for noise rejection, and complementary open-collector drivers for sinking large current loads. An internal bandgap regulator is used to provide temperature compensated supply voltage for internal circuits and allows a wide operating supply voltage.

CR211 could support 300mA driven current and wide operating voltage range. FG signal, an open collector, provides a square waveform output for the detection of the motor speed.

2. Feature

- On-chip Hall sensor with two different sensitivity and hysteresis settings
- Two complementary output
- Build in FG output for speed detection compatible with CMOS and TTL interface
- Wide operating voltage range: 4V~20V
- Output sink current up to 300mA

3. Application Range

- Dual-coil Brush-less DC Motor
- Dual-coil Brush-less DC Fan
- Revolution Counting
- Speed Measurement
4. Block Diagram

5. Pin Description

<table>
<thead>
<tr>
<th>Pin Number</th>
<th>Symbol</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>FG</td>
<td>Speed Output</td>
</tr>
<tr>
<td>2</td>
<td>DO</td>
<td>Output 1</td>
</tr>
<tr>
<td>3</td>
<td>DOB</td>
<td>Output 2</td>
</tr>
<tr>
<td>4</td>
<td>GND</td>
<td>Ground</td>
</tr>
</tbody>
</table>

6. Absolute Maximum Rating

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Description</th>
<th>Min.</th>
<th>Max.</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>VCC</td>
<td>Supply Voltage</td>
<td>–</td>
<td>30</td>
<td>V</td>
</tr>
<tr>
<td>IOUT</td>
<td>Supply current</td>
<td>350</td>
<td></td>
<td>mA</td>
</tr>
<tr>
<td>T_{stg}</td>
<td>Storage Temperature</td>
<td>–65</td>
<td>150</td>
<td>℃</td>
</tr>
<tr>
<td>T_{op}</td>
<td>Operating Temperature</td>
<td>–20</td>
<td>80</td>
<td>℃</td>
</tr>
</tbody>
</table>
### 7. Electrical Characteristics

\( V_{CC} = 12V, T_a = 25^\circ C \)

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Description</th>
<th>Test Condition</th>
<th>Min.</th>
<th>Typ.</th>
<th>Max.</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>( V_{CC} )</td>
<td>Power Supply</td>
<td></td>
<td>3</td>
<td>20</td>
<td></td>
<td>V</td>
</tr>
<tr>
<td>( I_{CC} )</td>
<td>Supply Current</td>
<td>( B = 0GS )</td>
<td>11</td>
<td>15</td>
<td></td>
<td>mA</td>
</tr>
<tr>
<td>( V_{OL} )</td>
<td>Output Low Voltage</td>
<td>( I_{OUT}=300mA )</td>
<td></td>
<td>600</td>
<td></td>
<td>mV</td>
</tr>
<tr>
<td>( I_{LK} )</td>
<td>Leakage of FG Output</td>
<td>( V_{OUT}=24V )</td>
<td>1</td>
<td></td>
<td></td>
<td>uA</td>
</tr>
<tr>
<td>( V_{FG} )</td>
<td>FG Output Low Voltage</td>
<td>( I_{FG}=5mA )</td>
<td></td>
<td>500</td>
<td></td>
<td>mV</td>
</tr>
<tr>
<td>( T_r )</td>
<td>Output Rising Time</td>
<td>( RL=820\Omega CL=20pF )</td>
<td>3</td>
<td>10</td>
<td></td>
<td>uS</td>
</tr>
<tr>
<td>( T_f )</td>
<td>Output Falling Time</td>
<td>( RL=820\Omega CL=20pF )</td>
<td>0.3</td>
<td>1.5</td>
<td></td>
<td>uS</td>
</tr>
</tbody>
</table>

### 8. Magnetic Characteristics

\( V_{CC} = 12V, T_a = 25^\circ C \)

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Characteristic</th>
<th>Grade</th>
<th>Min.</th>
<th>Typ.</th>
<th>Max.</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>( B_{OP} )</td>
<td>Operating Point</td>
<td>A</td>
<td>0</td>
<td>50</td>
<td></td>
<td>GS</td>
</tr>
<tr>
<td></td>
<td></td>
<td>B</td>
<td>70</td>
<td></td>
<td></td>
<td>GS</td>
</tr>
<tr>
<td></td>
<td></td>
<td>C</td>
<td>90</td>
<td></td>
<td></td>
<td>GS</td>
</tr>
<tr>
<td></td>
<td></td>
<td>D</td>
<td>120</td>
<td></td>
<td></td>
<td>GS</td>
</tr>
<tr>
<td>( B_{RP} )</td>
<td>Releasing Point</td>
<td>A</td>
<td>-50</td>
<td>0</td>
<td></td>
<td>GS</td>
</tr>
<tr>
<td></td>
<td></td>
<td>B</td>
<td>-70</td>
<td></td>
<td></td>
<td>GS</td>
</tr>
<tr>
<td></td>
<td></td>
<td>C</td>
<td>-90</td>
<td></td>
<td></td>
<td>GS</td>
</tr>
<tr>
<td></td>
<td></td>
<td>D</td>
<td>-120</td>
<td></td>
<td></td>
<td>GS</td>
</tr>
<tr>
<td>( B_{HY} )</td>
<td>Hysteresis</td>
<td></td>
<td>30</td>
<td>110</td>
<td></td>
<td>G</td>
</tr>
</tbody>
</table>
9. Typical Application

10. Magnetic Characteristics
11. Package and Sensor Location

**Package Dimension**

```
Package Sensor Location

```

```
2 Hall Sensor Area 0.77

```

```
5.13101

```

```
0.35

```

```
0.20

```

```
0.25

```

```
0.36

```

```
1.656

```

```
0.77

```

```
2.81

```

```
3.27

```

```
R0.25

```

```
R

```

```
W

```

```
H

```

```
L

```

```

```

```

```

**CR22PHASE DC MOTOR DRIVER 11TH SPEED DETECTION**