Three-Phase BLDC Gate Driver with Power Module

Analog and Interface Products Division

November 26, 2013
MCP8024: Feature Rich 3-Phase Motor Gate Driver

Industry’s first motor driver with configurable safety parameters.

Reusability and flexibility with broad range of MCUs reduces time to market.

The integrated analog functions and voltage regulators reduce board space, complexity and cost.

150°C ambient temperature rated device for operating in harsh environments.
Microchip’s Motor Control and Drive Solution

- The MCP8024 and broad selection of Microchip’s PIC® MCUs and dsPIC® DSCs offers complete BLDC or PMSM solutions.
# Analog & Interface Products

## THERMAL MANAGEMENT
- Temperature Sensors
- Fan Control and Hardware Management

## LINEAR
- Single Supply CMOS Op Amps
- Comparators
- RF Power Amplifiers, PGA, SGA
- **MOTOR DRIVER ICs**
  - Stepper and DC/3Φ Brushless DC

## POWER MANAGEMENT
- Linear Regulators
- Switching Regulators
- Digitally-Enhanced & PWM Controllers
- Charge Pump DC/DC Converters
- Battery Management
- USB Port Power Controller
- System Supervisors Voltage Detectors
- Power MOSFET Drivers
- Power MOSFETs

## MIXED SIGNAL
- Delta-Sigma A/D Converters
- SAR A/D Converters
- Energy Measurement ICs
- Current/DC Power Measurement ICs
- Dual Slope / Display A/D Converters
- D/A Converters
- Digital Potentiometers
- Voltage References

## INTERFACE
- CAN/LIN
- USB and I/O Expanders
- Ethernet
- Wireless
- Real Time Clock/Calendar

## SAFETY AND SECURITY
- Smoke Detector ICs
- Piezoelectric Horn Drivers
Markets and Applications

- **Automotive**
  - Blowers, Pumps, Actuators, Fans

- **Industrial**
  - Power Tools, Blowers, Automation, Robots, Fans
Traditional BLDC Design
Microchip’s Complete Motor Control and Drive Solution
MCP8024 Key Features

Three-Phase BLDC Gate Driver with Power Module

- Operational voltage range: 6V – 28V
- Extended temperature range: $T_A$ -40°C to +150°C
- 3-pair n-channel half-bridge gate drivers for sinusoidal and six step algorithm
- Peak gate drive output current – 0.5A at 12V
- 750 mW adjustable buck regulator for MCUs and DSCs
- 12V and 5V LDO
- 48V Load dump protection
- 3 current-sense op amps, 1 over-current comparator

Marketing Samples Available Now
AEC-Q100 Grade 0
PPAP – Q1CY14
## MCP8024 Features + Benefits

<table>
<thead>
<tr>
<th>Features</th>
<th>Benefits</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>High performance integration</strong></td>
<td></td>
</tr>
<tr>
<td>- Three op-amps</td>
<td>Reduces external components and MCU requirements</td>
</tr>
<tr>
<td>- Three half-bridge MOSFET gate drivers</td>
<td>Enables higher performing products at reduced board space</td>
</tr>
<tr>
<td>- Internal over-current comparator</td>
<td></td>
</tr>
<tr>
<td><strong>Integrated power management unit</strong></td>
<td></td>
</tr>
<tr>
<td>- 750 mW adjustable buck regulator</td>
<td>Eliminates additional voltage regulators in a system with high-efficiency buck regulator and two LDO regulators</td>
</tr>
<tr>
<td>- 5V LDO, 12V LDO</td>
<td>Helps to reduce power dissipation and heat generation in high-temperature environment</td>
</tr>
<tr>
<td>- 12V charge pump</td>
<td></td>
</tr>
<tr>
<td><strong>Industry’s first motor driver with</strong></td>
<td></td>
</tr>
<tr>
<td><strong>configurable parameters</strong></td>
<td></td>
</tr>
<tr>
<td>- Selectable dead-time</td>
<td>Adjust to meet target application</td>
</tr>
<tr>
<td>- Selectable blanking-time</td>
<td>Flexibility and reusability that reduce time-to-market</td>
</tr>
<tr>
<td>- Selectable over-current limit</td>
<td></td>
</tr>
</tbody>
</table>
MCP8024 Evaluation Board

Features

- Input Voltages from 6V to 28V
- Microchip’s dsPIC33F PIM (Plug-in-Module)
- Drives BLDC Motors
- Reprogrammable

MCP8024 TQFP BLDC Motor Driver Evaluation Board (Part # ADM00557)
Pricing and Availability

- The MCP8024 is available now for sampling and volume production
- 5k-unit Pricing...

<table>
<thead>
<tr>
<th>Product</th>
<th>Package</th>
<th>5ku Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>MCP8024-H/MP</td>
<td>5x5mm 40-Pin QFN-EP</td>
<td>$2.64</td>
</tr>
<tr>
<td>MCP8024-H/TP</td>
<td>7x7mm 48-Pin TQFP-EP</td>
<td>$2.81</td>
</tr>
</tbody>
</table>
MCP8024’s Winning Attributes

- Complete motor-control and drive solution from Microchip
- Supports broad range of dsPIC® DSCs, PIC® MCUs, general-purpose MCUs and FPGAs
- Reduces external components with high integration and configurability
- For more information, please go to www.microchip.com/motor
Thank You

Note: The Microchip name and logo, dsPIC, and PIC are registered trademarks of Microchip Technology Incorporated in the U.S.A. and other countries. All other trademarks mentioned herein are the property of their respective companies.