

# FCM8201

## 3-Phase Sinusoidal Brushless DC Motor Controller

### Features

- Supports Space Vector Modulation (SVM)
- Supports Sine-Wave & Square-Wave Solutions
- Built-in Clock Generator
- Built-in Error Amplifier for Torque Loop Control
- Direct Duty Control
- Square-Wave 120°, Sine-Wave 180° Turn-on
- PLL Angle Detection (Hall Sensors)
- Programmable Current Leading Phase
- Serial Interface (SPI)
- Two Operation Modes (Stand-Alone Operation or Controlled through SPI)
- Programmable Soft-Switching (Dead-Time)
- Synchronous Rectifying
- Over-Voltage and Under-Voltage Protections
- Motor & Power Transistor Over-Voltage Protections
- Three Levels of Over-Current Protection (OCP)
- Programmable OC Timer
- Over-Temperature Protection (OTP)

### Applications

- BLDC Motor or PMSM Control
- Low-Noise Motor Applications
- Fans, Pump, Tools, etc.

### Description

FCM8201 is a three-phase sinusoidal Brushless DC (BLDC) motor or Permanent Magnet Synchronous Motor (PMSM) controller. It comes with the advanced Hall sensor design. Using the Hall sensor signals, the control system is able to execute the PWM commutation by switching the three-phase inverter. There are two PWM modes for selection: Sine-Wave Mode and the Square-Wave Mode. Square-Wave Mode includes PWM-PWM and PWM-ON approaches to improve the efficiency of the motor drive. Protection functions including over-voltage, over-current, over-temperature, and short circuit prevent the control circuits and the motor from being damaged, particularly under stressed applications and demanding environments. Information about voltage, current, and temperature is accessible through the SPI interface.

FCM8201 can be operated stand-alone or worked with microcontrollers for advanced BLDC motor control.

### Ordering Information

Part Number	Operating Temperature Range	Package	Packing Method
FCM8201QY	-40°C to 125°C	32-Lead, LQFP, JEDEC MS-026, Variation BBA, 7 mm Square	Tray

# Fcm8201 3 Phase Sinusoidal Brushless Dc Motor Controller

**Mohammed A. Abdelhadi, Gregory C.  
Charlton, Bryan C. H. Li**

## **Fcm8201 3 Phase Sinusoidal Brushless Dc Motor Controller:**

**Speed Control of Sensorless Brushless DC Motor** MD Sabbir Ahmed, 2018-11-22 This book is all about running a brushless DC motor using a sensorless technique The target of the work was to make a very simple operating method for a brushless motor and formulate a speed control mechanism Initially the work was started with both considering back EMF and without considering back EMF Because of more complexity in the back EMF sensing method and as our intention was to make a simpler and cost effective operation so finally we assembled our project the without back EMF sensing Even though being a simple and inexpensive machine the performance was quite good However adding back EMF sensing in this machine can give it more dependability

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*Three Phase Permanent Magnet Brushless DC Motor Controller* Mohd. Syafiq Mohd, 2011 Brushless Motors and Controllers Roland Büchi, 2012 In recent years brushless DC motors and controllers have begun an unparalleled triumph in model construction and in all technical fields This book is intended to show how a brushless motor works The basic principle is discussed first before all the key terms such as kV and rpm V operating voltage load and idle current torque turns electrical and mechanical power losses efficiency etc are explained A brushless motor can t work without a brushless

controller it requires a three phase AC voltage To increase the speed properly the controller must have information on the rotor position This can be done by Hall sensors or directly via the motor windings All that will be taken into account in the book *Permanent Magnet Brushless DC Motor Drives and Controls* Chang-liang Xia,2012-04-24 An advanced introduction to the simulation and hardware implementation of BLDC motor drives A thorough reference on the simulation and hardware implementation of BLDC motor drives this book covers recent advances in the control of BLDC motor drives including intelligent control sensorless control torque ripple reduction and hardware implementation With the guidance of the expert author team readers will understand the principle modelling design and control of BLDC motor drives The advanced control methods and new achievements of BLDC motor drives of interest to more advanced readers are also presented Focuses on the control of PM brushless DC motors giving readers the foundations to the topic that they can build on through more advanced reading Systematically guides readers through the subject introducing basic operational principles before moving on to advanced control algorithms and implementations Covers special issues such as sensorless control intelligent control torque ripple reduction and hardware implementation which also have applications to other types of motors Includes presentation files with lecture notes and Matlab 7 coding on a companion website for the book *Brushless Dc Motors* Thomas J. Sokira,Wolfgang Jaffe,1990 **State Space Control Design of a Three Phase Brushless DC Motor** David J. Caballero,2011 [Discrete time sliding mode control strategies applied to a multiphase brushless DC machine](#) Godoi Dias, Milena Sabrina,2017 Nowadays environmental issues motivates the replacement of mechanical hydraulic and pneumatic system by electrical system in the transport sector aiming to reduce emissions generated by burning of fossil fuels in vehicles The electrical system must ensure high electrical efficiency and should not exceed the weight of the substituted components To attend these high performance requirements a fault tolerant multiphase brushless DC machine was chosen for this research The present work introduces a six phase 600W brushless DC machine with 8 poles The main challenge for the control issues of this machine is the mutual magnetic coupling between the phases due to the wave winding machine configuration In this context theoretical and practical investigations of different current control strategies based on the sliding mode control approach applied to the six phase brushless DC machine are presented *Permanent Magnet Synchronous and Brushless DC Motor Drives* Ramu Krishnan,2017-12-19 Despite two decades of massive strides in research and development on control strategies and their subsequent implementation most books on permanent magnet motor drives still focus primarily on motor design providing only elementary coverage of control and converters Addressing that gap with information that has largely been disseminated only in journals and at conferences *Permanent Magnet Synchronous and Brushless DC Motor Drives* is a long awaited comprehensive overview of power electronic converters for permanent magnet synchronous machines and control strategies for variable speed operation It introduces machines power devices inverters and control and addresses modeling implementation control strategies and flux weakening operations as well as parameter

sensitivity and rotor position sensorless control Suitable for both industrial and academic audiences this book also covers the simulation low cost inverter topologies and commutation torque ripple of PM brushless DC motor drives Simulation of the motor drives system is illustrated with MATLAB codes in the text This book is divided into three parts fundamentals of PM synchronous and brushless dc machines power devices inverters PM synchronous motor drives and brushless dc motor drives With regard to the power electronics associated with these drive systems the author Explores use of the standard three phase bridge inverter for driving the machine power factor correction and inverter control Introduces space vector modulation step by step and contrasts with PWM Details dead time effects in the inverter and its compensation Discusses new power converter topologies being considered for low cost drive systems in PM brushless DC motor drives This reference is dedicated exclusively to PM ac machines with a timely emphasis on control and standard and low cost converter topologies Widely used for teaching at the doctoral level and for industrial audiences both in the U S and abroad it will be a welcome addition to any engineer s library *Advanced Health Management of a Brushless Direct Current Motor/Controller* ,2003

*Direct Torque Control of Permanent Magnet Synchronous Motors with Non-sinusoidal Back-EMF* Salih Baris Ozturk,2010 This work presents the direct torque control DTC techniques implemented in four and six switch inverter for brushless dc BLDC motors with non sinusoidal back EMF using two and three phase conduction modes First of all the classical direct torque control of permanent magnet synchronous motor PMSM with sinusoidal back EMF is discussed in detail Secondly the proposed two phase conduction mode for DTC of BLDC motors is introduced in the constant torque region In this control scheme only two phases conduct at any instant of time using a six switch inverter By properly selecting the inverter voltage space vectors of the two phase conduction mode from a simple look up table the desired quasi square wave current is obtained Therefore it is possible to achieve DTC of a BLDC motor drive with faster torque response while the stator flux linkage amplitude is deliberately kept almost constant by ignoring the flux control in the constant torque region Third the average current controlled boost power factor correction PFC method is applied to the previously discussed proposed DTC of BLDC motor drive in the constant torque region The test results verify that the proposed PFC for DTC of BLDC motor drive improves the power factor from 0.77 to about 0.9997 irrespective of the load Fourth the DTC technique for BLDC motor using four switch inverter in the constant torque region is studied For effective torque control in two phase conduction mode a novel switching pattern incorporating the voltage vector look up table is designed and implemented for four switch inverter to produce the desired torque characteristics As a result it is possible to achieve two phase conduction DTC of a BLDC motor drive using four switch inverter with faster torque response due to the fact that the voltage space vectors are directly controlled Finally the position sensorless direct torque and indirect flux control DTIFC of BLDC motor with non sinusoidal back EMF has been extensively investigated using three phase conduction scheme with six switch inverter In this work a novel and simple approach to achieve a low frequency torque ripple free direct torque control with maximum efficiency based

on dq reference frame similar to permanent magnet synchronous motor PMSM drives is presented

**Adaptive Control of Sinusoidal Brushless DC Motor Actuators** Liangtao Zhu,2008

**Intelligent Control of Brushless DC Motors for Hybrid Electric Vehicle Applications** Aayush Gupta,2010

*Brushless DC Motor Controller* Ahmad Ali Rezaei-Lori,1987

**Extending the Constant Power Speed Range of the Brushless DC Motor Through Dual Mode Inverter Control -- Part I**,2001 An inverter topology and control scheme has been developed that can drive low inductance surface mounted permanent magnet motors over the wide constant power speed range required in electric vehicle applications This new controller is called the dual mode inverter control DMIC 1 The DMIC can drive either the Permanent Magnet Synchronous Machine PMSM with sinusoidal back emf or the brushless dc machine BDCM with trapezoidal emf in the motoring and regenerative braking modes In this paper we concentrate on the BDCM under high speed motoring conditions Simulation results show that if all motor and inverter loss mechanisms are neglected the constant power speed range of the DMIC is infinite The simulation results are supported by closed form expressions for peak and rms motor current and average power derived from analytical solution to the differential equations governing the DMIC BDCM drive for the lossless case The analytical solution shows that the range of motor inductance that can be accommodated by the DMIC is more than an order of magnitude such that the DMIC is compatible with both low and high inductance BDCMs Finally method is given for integrating the classical hysteresis band current control used for motor control below base speed with the phase advance of DMIC that is applied above base speed The power versus speed performance of the DMIC is then simulated across the entire speed range

**Brushless DC Motor Controller** Jane Layton,1991

**Implementation of a Brushless DC Motor Controller** Wai-Lun Lee,1992

Designing a Brushless DC Motor Controller Mohammed A. Abdelhadi,Gregory C. Charlton,Bryan C. H. Li,2014

Implementation of a Sinusoidal Current Drive for a Brushless Three Phase Motor Using a Common Sense Resistor for Rotor Position Feedback Gregory Emil Swize,1998

**Sensorless, Brushless DC Motor Controller** Raleigh G. Thompson,Purdue University Calumet. Electrical Engineering Technology Department,2000

**Fpga Controlled Three Phase Inverter Based Blcdc Motor Drive** Banerjee Atanu,2015-02-11 This book presents a brief overview of the Brush less D C Machine BLDCM covering its construction classification control usage etc Presented further are two possible modeling strategies of this machine and their drawbacks An attractive method by solving loop equations for instantaneous current is also discussed This is followed by the simulation of a BLDC motor in the abc dq frame by using MATLAB SIMULINK Some simulation results are presented Also included are the results of some tests conducted on the machine Due to the unavailability of the stator neutral the tests to determine d and q axis inductances have failed The analytical reasons are presented A new method for controlling the drive by a efficient digital controller called Field Programmable gate Array FPGA has been discussed Three phase 1200 voltage source inverter has been simulated successfully using FPGA The control hardware comprising of FPGA driver circuit of three phase inverter inverter module has

been run successfully Results of that test have been presented

The Enigmatic Realm of **Fcm8201 3 Phase Sinusoidal Brushless Dc Motor Controller**: Unleashing the Language is Inner Magic

In a fast-paced digital era where connections and knowledge intertwine, the enigmatic realm of language reveals its inherent magic. Its capacity to stir emotions, ignite contemplation, and catalyze profound transformations is nothing lacking extraordinary. Within the captivating pages of **Fcm8201 3 Phase Sinusoidal Brushless Dc Motor Controller** a literary masterpiece penned by way of a renowned author, readers attempt a transformative journey, unlocking the secrets and untapped potential embedded within each word. In this evaluation, we shall explore the book is core themes, assess its distinct writing style, and delve into its lasting affect the hearts and minds of people who partake in its reading experience.

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