

**8051-Based MCU**



# **CGF022A**

## **Data Sheet**

*8Bit Single-Chip Microcontroller  
Embedded 40V 3-Phase Gate-Driver*

**Version: V0.0**

## Features

### Motor Driving Engine (MDE)

- Estimated Angle Phase Lock Loop (PLL)
- Field Oriental Control (FOC) Sine-Wave Solutions
- Slide Mode Rotor Position Estimated (SMO)
- Space Vector PWM (SVPWM)
- Supports Digital OCP and Analog OCP (Over Current Protection)
- Supports Initial Position Detection (IPD)
- Programmable Dead-Time
- Independent PI Controller
- Independent General Low Pass Filter
- Frequency Generator

### Gate Driver

- Integrated 40V 3-phase P/N MOSFET Pre-driver
- Shoot-through protection
- Built-in 5V LDO
- 

### Embedded MCU

- MCS<sup>®</sup>-51 Compatible
- 1T 8052 Central Processing Unit
- 4.5V to 5.5V Operation Range
- 4 Level Priority Interrupt
- 13 Interrupt Sources
- 1 External Interrupts (INT1N)
- 2 External Interrupts (INT0N, INT1N)
- 2 External OCP Interrupts (AOCP, OCP)
- Memory Size:
- 16KB Flash Program Memory
- 256 x 8-bit IRAM
- 512 x 8-bit XRAM
- 256 Byte EEPROM
- Up to 25 General-Purpose Input / Output (GPIO) Pins
- Three 16-bit Timer/Counters
- Watchdog (WD) Timer
- 8CH 10-bit ADC & 1CH 10-bit DAC
- Full Duplex UART Serial Channel
- IIC Interface (Master/Slave Mode)
- One Wire RF/IR Receiver Output Signal Decode
- CRC16-CCITT Function
- Independent General PWM
- External Capture
- Internal Capture
- Fast Multiplication-Division Unit (MDU):  
16\*16,32/16, 16/16, 32-bit L/R shifting and 32-bit normalization

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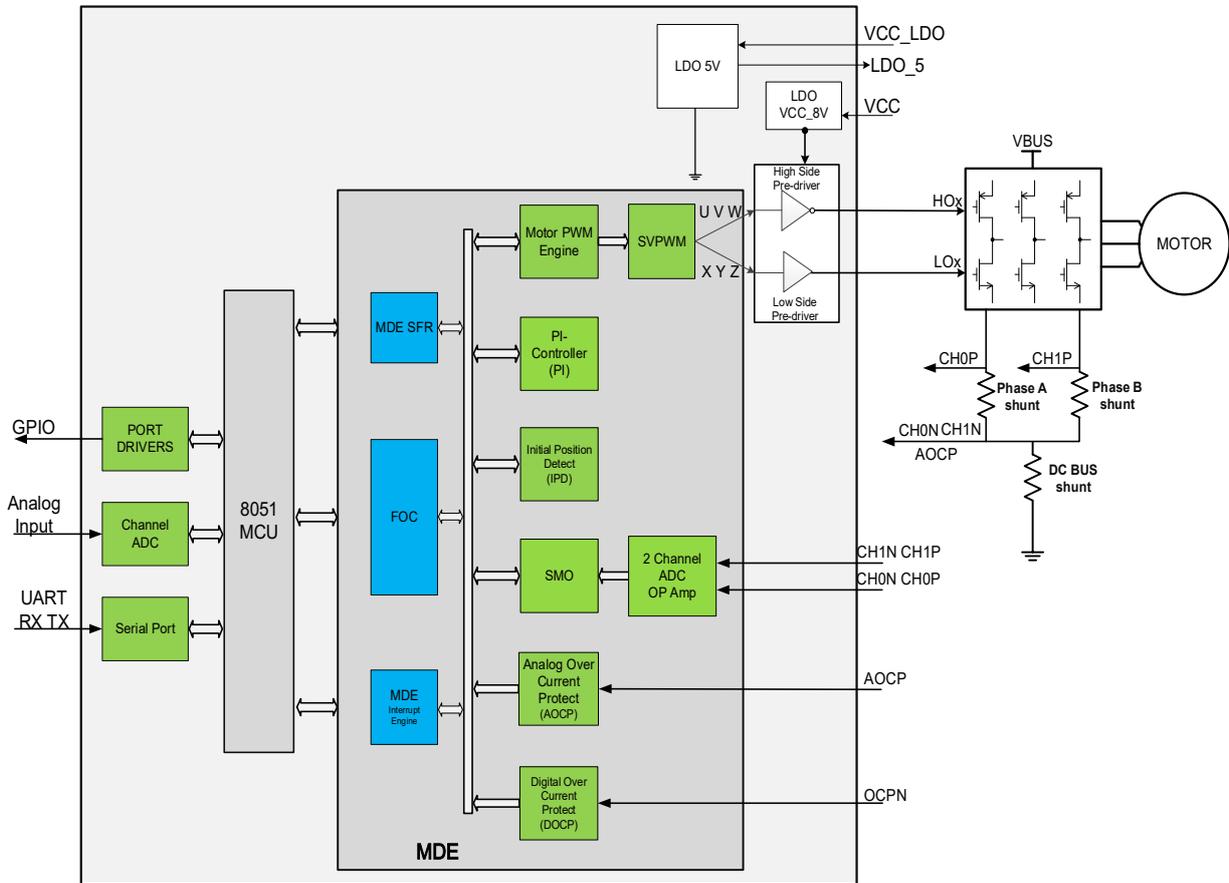
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## 1. General Description

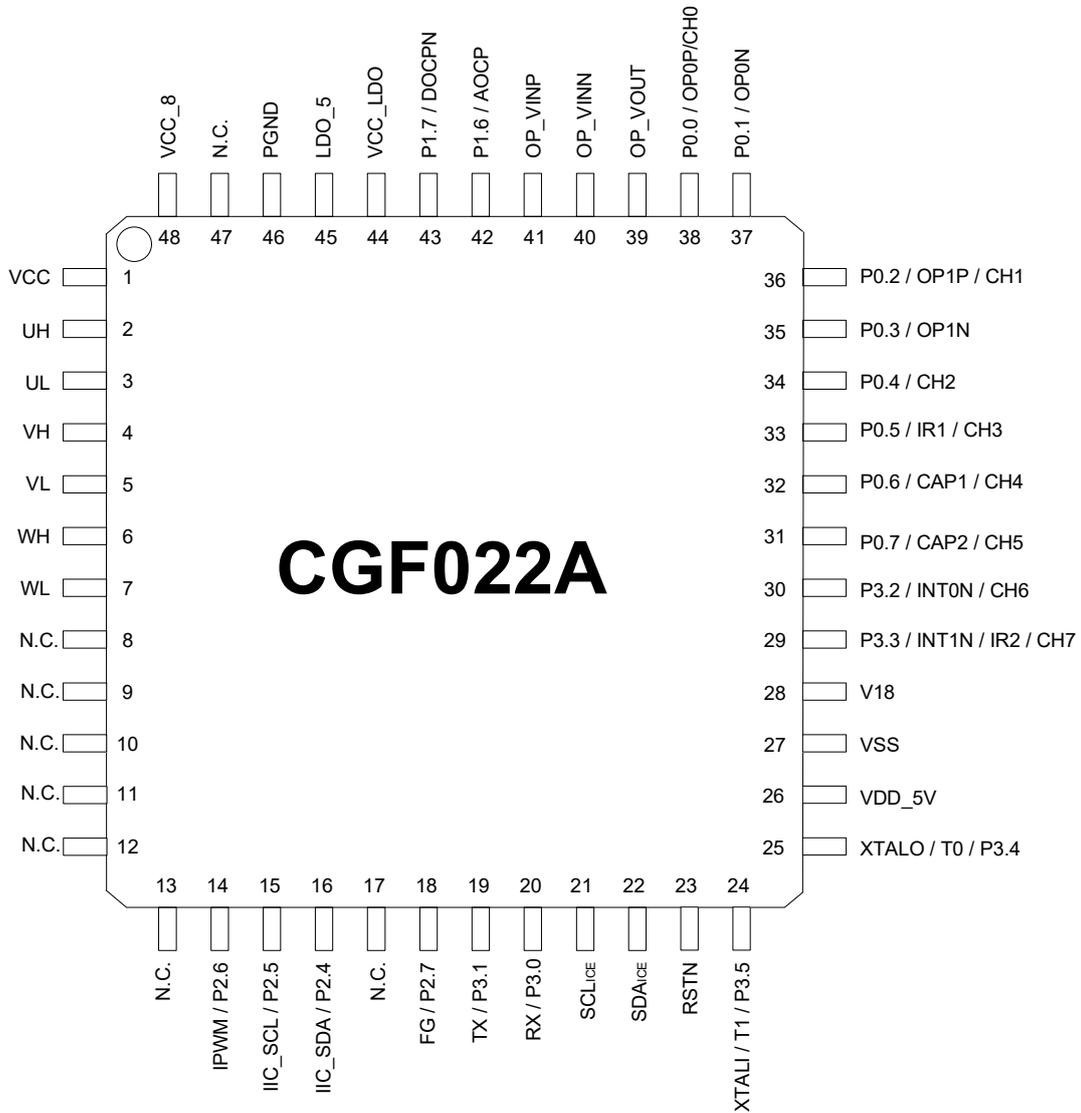
The CGF022A is a highly integrated motor drive controller. The CGF022A is composed of FOC sensor-less MCU and 40V 3-phase P/N Gate-Driver that suit for under DC 40V and medium motor system, for example household fan, water pump, industry fan...etc.

## 2. Block Diagram



### 3. Pin Configurations

#### 3.1. Package Instruction LQFP7x7- 48



### 3.2. Pin Description

Table 3.1. Pin Description

| Pin # | Name               | Type   | Description   |
|-------|--------------------|--------|---|
| 1     | VCC                | Power  | Supply voltage input.   |
| 2     | UH                 | O      | High side phase-U PMOS driver.  |
| 3     | UL                 | O      | Low side phase-U NMOS driver.   |
| 4     | VH                 | O      | High side phase-V PMOS driver.  |
| 5     | VL                 | O      | Low side phase-V NMOS driver.   |
| 6     | WH                 | O      | High side phase-W PMOS driver.  |
| 7     | WL                 | O      | Low side phase-W NMOS driver.   |
| 8     | NC                 |        |   |
| 9     | NC                 |        |   |
| 10    | NC                 |        |   |
| 11    | NC                 |        |   |
| 12    | NC                 |        |   |
| 13    | NC                 |        |   |
| 14    | P2.6               | I/O    | Bit6 of Port 2.   |
|       | IPWM               | O      | Independent User PWM Output   |
| 15    | P2.5               | I/O    | Bit5 of Port 2.   |
|       | IIC_SCL            | O      | IIC clock   |
| 16    | P2.4               | I/O    | Bit4 of Port 2.   |
|       | IIC_SDA            | O      | IIC data  |
| 17    | NC                 |        |   |
| 18    | P2.7               | I/O    | Bit7 of Port 2.   |
|       | FG                 | O      | Function Generate Output  |
| 19    | P3.1               | I/O    | Bit1 of Port 3.   |
|       | TX                 | O      | Serial Data Receive (UART)  |
| 20    | P3.0               | I/O    | Bit0 of Port 3.   |
|       | RX                 | I      | Serial Data Transmit (UART)   |
| 21    | SCL <sub>ICE</sub> |        | For ICE.  |
| 22    | SDA <sub>ICE</sub> |        | For ICE.  |
| 23    | RSTN               | I      | System Reset.   |
| 24    | P3.5               | I/O    | Bit 5 of Port 3   |
|       | XTALI              | I      | Crystal input pin. <b>Connect the crystal 12MHz between this pin and XTALO and a 22pF capacitor to VSS</b>  |
|       | T1                 | I      | TIMER1 External Input   |
| 25    | P3.4               | I/O    | Bit 4 of Port 3   |
|       | XTALO              | O      | Crystal output pin. <b>Connect the crystal 12MHz between this pin and XTALI and a 22pF capacitor to VSS</b> |
|       | T0                 | I      | TIMER0 External Input   |
| 26    | VDD5               | Power  | 5.0V Voltage Input. A 0.1uF and 10uF (minimum) capacitor should be connected between this pin and VSS.      |
| 27    | VSS                | Ground | Power Ground.   |
| 28    | V18                | O      | 1.8V Voltage Output. A 0.1uF and 1uF (minimum) capacitor should be connected between this pin and VSS.      |
| 29    | P3.3               | I/O    | Bit 3 of Port 3   |
|       | CH7                | I      | Analog Input Ch7  |

|    |         |        |   |
|----|---------|--------|---|
|    | INT1N   | I      | External Interrupt 1. Low level trigger or falling edge trigger |
|    | IR2     | I      | IR receiver signal input 2                                      |
| 30 | P3.2    | I/O    | Bit2 of Port 3  |
|    | CH6     | I      | Analog Input Ch6  |
|    | INT0N   | I      | External Interrupt 0. Low level trigger or falling edge trigger |
| 31 | P0.7    | I/O    | Bit7 of Port 0  |
|    | CH5     | I      | Analog Input Ch5  |
|    | CAP2    | I      | Capture Input 2   |
| 32 | P0.6    | I/O    | Bit6 of Port 0  |
|    | CH4     | I      | Analog Input Ch4  |
|    | CAP1    | I      | Capture Input 1   |
| 33 | P0.5    | I/O    | Bit5 of Port 0  |
|    | CH3     | I      | Analog Input Ch3  |
|    | IR1     | I      | IR receiver signal input 1                                      |
| 34 | P0.4    | I/O    | Bit4 of Port 0.   |
|    | CH2     | I      | Analog Input Ch2.   |
| 35 | P0.3    | I/O    | Bit3 of Port 0.   |
|    | OP1N    | 0      | OP1-Amp N- Input  |
| 36 | P0.2    | I/O    | Bit2 of Port 0.   |
|    | CH1     | I      | Analog Input Ch1. (Current feedback)                            |
|    | OP1P    | I      | OP1-Amp P-Input.  |
| 37 | P0.1    | I/O    | Bit1 of Port 0.   |
|    | OP0N    | I      | OP0-Amp N-Input.  |
| 38 | P0.0    | I/O    | Bit0 of Port 0.   |
|    | CH0     | I      | Analog Input Ch0. (Current feedback)                            |
|    | OP0P    | I      | OP0-Amp P- Input.   |
| 39 | OP_VOUT | O      | OPA output  |
| 40 | OP_VINN | I      | OPA N-Input   |
| 41 | OP_VINP | I      | OPA P-Input   |
| 42 | P1.6    | I/O    | Bit6 of Port 1.   |
|    | AOCP    | I      | Analog OCP Control.   |
| 43 | P1.7    | I/O    | Bit7 of Port 1.   |
|    | DOCPN   | I      | Digital OCP Control.  |
| 44 | VCC_LDO | Power  | LDO 5V power supply.  |
| 45 | LDO_5   | Power  | 5V output of LDO.   |
| 46 | PGND    | Ground | Power ground.   |
| 47 | NC      |        |   |
| 48 | VCC_8   | O      | LDO VCC_8 output  |