

SKU:DFR1034 (<https://www.dfrobot.com/product-2754.html>)

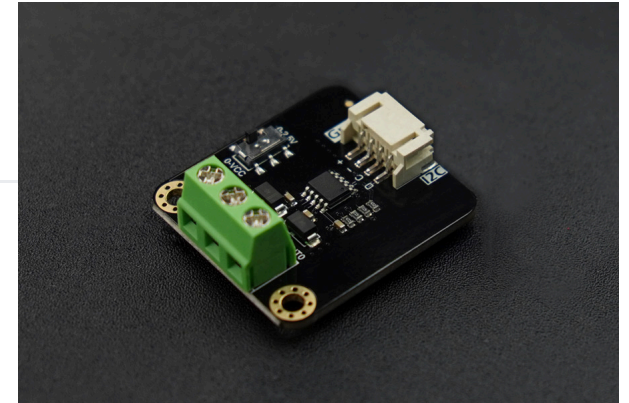
(<https://www.dfrobot.com/product-2754.html>)

INTRODUCTION

DAC series modules are a range of products that can be controlled through I2C or PWM signals to generate voltage or current output signals. They possess the capability to produce a variety of analog voltage or current signals, including 0-5V, 0-10V, 0-2.5V, 0-VCC, and 0-25mA.

An analog quantity refers to the continuous variation of voltage magnitude (or current magnitude) within a specific range. Due to its stability, long transmission distance, and ease of use, it has found widespread application in the field of industrial automation control, including:

- Motor speed control
 - Sound intensity control
 - Temperature regulation
 - Adjustment of light brightness
 - Valve angle modulation
- etc.



INTRODUCTION

DFR1034-GP8503 (2-Channel 12bit I2C to 0-2.5V/VCC DAC Module)

FUNCTIONS

FEATURES

DIMENSION

FUNCTIONAL DIAGRAM

SPECIFICATIONS

TUTORIAL

More Documents

FAQ



INTRODUCTION

DFR1034-GP8503 (2-Channel 12bit I2C to 0-2.5V/VCC DAC Module)

FUNCTIONS

FEATURES

DIMENSION

FUNCTIONAL DIAGRAM

SPECIFICATIONS

TUTORIAL

More Documents

FAQ

This series of DAC products not only offers a variety of output signal ranges, but also provides three selectable resolutions: 8-bit, 12-bit, and 15-bit. It allows for the choice of either single-channel or dual-channel configurations, and multiple modules can be cascaded to form a multi-channel output. When coupled with Arduino controllers, Raspberry Pi, STM32, and similar controllers, it finds application in various automation control scenarios, including:

- Laboratory testing equipment
- Automatic motor speed control
- Indoor and outdoor lighting control
- Automated volume adjustment
- Backlight control for displays
- etc.

The following table presents the functional parameters of each DAC product for reference in the selection process.

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INTRODUCTION

DFR1034-GP8503 (2-Channel 12bit I2C to 0-2.5V/VCC DAC Module)

FUNCTIONS

FEATURES

DIMENSION

FUNCTIONAL DIAGRAM

SPECIFICATIONS

TUTORIAL

More Documents

FAQ

0-2.5V/VCC Product

SKU	Name	Chip module	Functional Diagram	Number of Channels	Output	Input	Resolution	Linearity error	Product Features
DFR1034	2-channel I2C to 0-2.5V/0-VCC	GP8503		2	0-2.5V/VCC	I2C	12bit	0.10%	2 channels, expandable up to 8 modules through cascading.
DFR1037	2-channel PWM to 0-2.5V/0-VCC	GP8501		2	0-2.5V/VCC	PWM	8bit	0.10%	2 channels, PWM input, versatile compatibility.
DFR1035	1-channel I2C to 0-2.5V/0-VCC	GP8512		1	0-2.5V/VCC	I2C	15bit	0.01%	High resolution and precision.

0-5V/10V Product

SKU	Name	Chip module	Functional Diagram	Number of Channels	Output	Input	Resolution	Linearity error	Product Features
DFR0971	2-channel I2C to 0-5V/0-10V	GP8403		2	0-5V/10V	I2C	12bit	0.10%	2 channels, expandable up to 8 modules through cascading.
DFR1073	2-channel 15bit I2C to 0-5V/0-10V	GP8413		2	0-5V/10V	I2C	15bit	0.01%	2 channels, offering high resolution and precision, expandable up to 8 modules through cascading.
DFR1071	1-channel 15bit I2C to 0-5V/0-10V	GP8211S		1	0-5V/10V	I2C	15bit	0.01%	High resolution and precision.
DFR1036	1-channel PWM to 0-5V/0-10V	GP8101S		1	0-5V/10V	PWM	8bit	0.10%	PWM input, versatile compatibility.

4-20mA Product

SKU	Name	Chip module	Functional Diagram	Number of Channels	Output	Input	Resolution	Linearity error	Product Features
DFR0972	1-channel I2C to 4-20mA	GP8302		1	0-20mA	I2C	12bit	0.10%	More stable current signal.

DFR1034-GP8503 (2-Channel 12bit I2C to 0-2.5V/VCC DAC Module)

FUNCTIONS

This is a 2-channel analog voltage output DAC module with I2C communication, 12-bit resolution, and 0.1% output voltage linearity error. It is well-suited for control projects operating within the 3.3V range, such as ESP32, Raspberry Pi, STM32, and other microcontrollers that require analog signal output.

INTRODUCTION

DFR1034-GP8503 (2-Channel 12bit I2C to 0-2.5V/VCC DAC Module)

FUNCTIONS

FEATURES

DIMENSION

FUNCTIONAL DIAGRAM

SPECIFICATIONS

TUTORIAL

More Documents

FAQ

FEATURES

- Support 3.3V-5V power supply.
- Output voltage linearity error of 0.1%.
- Two channels of voltage output, either 0-2.5V or 0-VCC, enabling connection and control of standard analog voltage devices.
- Gravity interface, I2C communication, Arduino control, suitable for program automation control.

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DIMENSION

INTRODUCTION

DFR1034-GP8503 (2-Channel 12bit I2C to 0-2.5V/VCC DAC Module)

FUNCTIONS

FEATURES

DIMENSION

FUNCTIONAL DIAGRAM

SPECIFICATIONS

TUTORIAL

More Documents

FAQ



Unit:mm

INTRODUCTION

DFR1034-GP8503 (2-Channel 12bit I2C to 0-2.5V/VCC DAC Module)

FUNCTIONS

FEATURES

DIMENSION

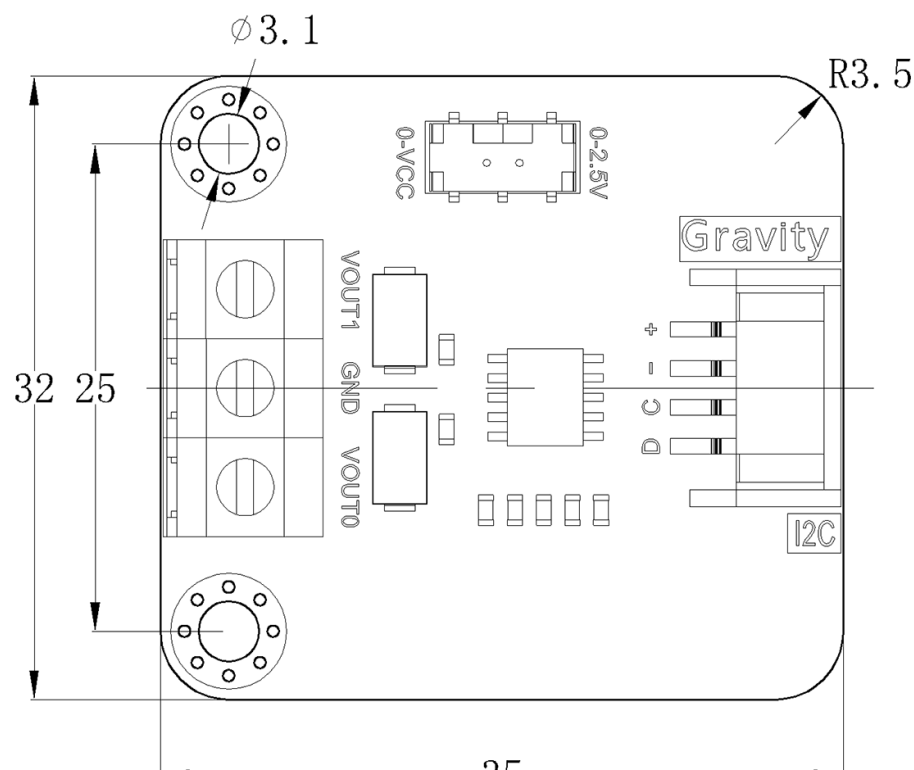
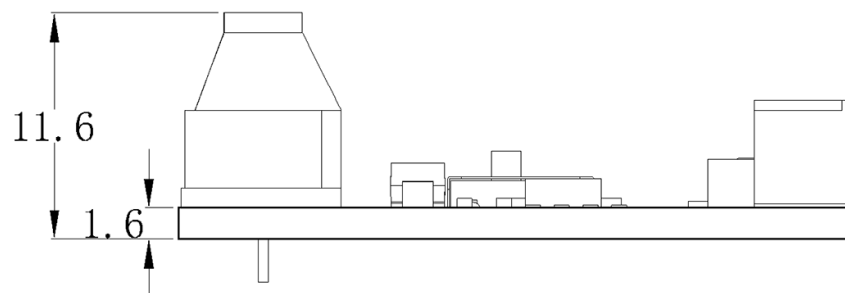
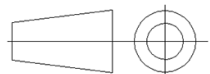
FUNCTIONAL DIAGRAM

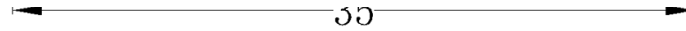
SPECIFICATIONS

TUTORIAL

More Documents

FAQ





INTRODUCTION

DFR1034-GP8503 (2-Channel 12bit I2C to 0-2.5V/VCC DAC Module)

FUNCTIONS

FEATURES

DIMENSION

FUNCTIONAL DIAGRAM

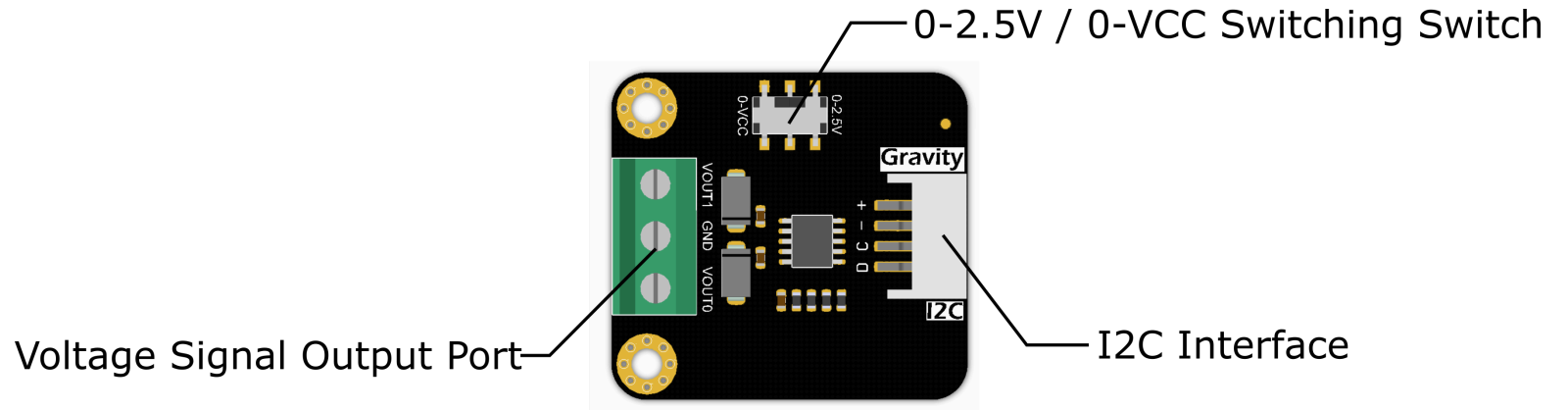
SPECIFICATIONS

TUTORIAL

More Documents

FAQ

FUNCTIONAL DIAGRAM



Name	Description	Remarks
12C Interface	+	Positive terminal of the power supply (3.3V-5V)
	-	Negative terminal of the power supply
	C	SCL
	D	SDA
0-2.5V/0-VCC SwitchingSwitch	0-VCC	Switch output voltage to 0V-VCC(Supply voltage)
	0-2.5V	Switch output voltage to 0V-2.5V
Voltage Signal Output Port	VOUT0	Positive terminal of output voltage signal 0
	VOUT1	Positive terminal of output voltage signal 1

Name	Description	Remarks
	GND	Negative terminal of the output voltage signal

INTRODUCTION

DFR1034-GP8503 (2-Channel 12bit I2C to 0-2.5V/VCC DAC Module)

FUNCTIONS

FEATURES

DIMENSION

FUNCTIONAL DIAGRAM

SPECIFICATIONS

TUTORIAL

More Documents

FAQ

SPECIFICATIONS

- Chip Type: GP8503
- Operating Voltage: 3.3V-5V
- Output Voltage: 0-2.5V or 0-VCC
- Number of Channels: 2 channels
- Communication Method: I2C
- Resolution: 12-bit
- Value Range: 0 - 4095 corresponding to 0-2.5V or 0-VCC
- Output voltage linearity error: 0.1%

TUTORIAL

In this example, we will demonstrate the output of different voltage values in two states.

Input signal value range: 0-4095

In the state of 0-2.5V:

- Channel 0 inputs 2654, resulting in an output of 1.62V.
- Channel 1 inputs 1095, resulting in an output of 0.668V.

In the state of 0-VCC:

- Channel 0 inputs 2654, resulting in an output of 3.23V.
- Channel 1 inputs 1095, resulting in an output of 1.334V.

SOFTWARE REQUIREMENTS

- Download Arduino IDE: Click to download Arduino IDE (<https://www.arduino.cc/en/Main/Software>)
- Download Arduino libraries: Click to download https://github.com/DFRobot/DFRobot_GP8XXX (https://github.com/DFRobot/DFRobot_GP8XXX)

Click the link to view: How to install the library?; (<http://www.dfrobot.com.cn/community/forum.php?mod=viewthread&tid=1854&page=1&extra=#pid6955>)

Note: All modules in this series utilize the same library.

INTRODUCTION

DFR1034-GP8503 (2-Channel 12bit I2C to 0-2.5V/VCC DAC Module)

FUNCTIONS

FEATURES

DIMENSION

FUNCTIONAL DIAGRAM

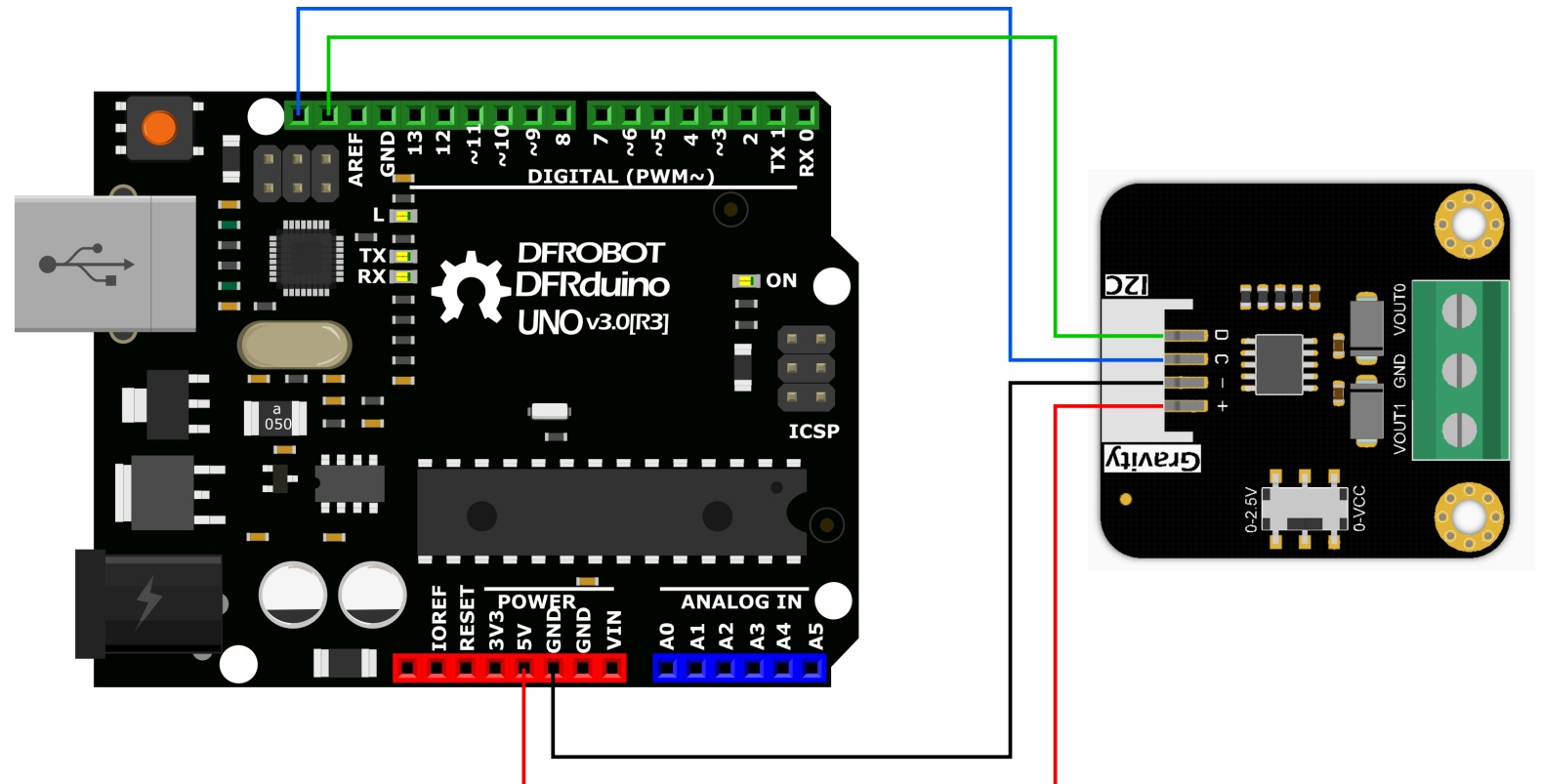
SPECIFICATIONS

TUTORIAL

More Documents

FAQ

HARDWARE CONNECTION



SAMPLE CODE

INTRODUCTION

DFR1034-GP8503 (2-Channel 12bit I2C to 0-2.5V/VCC DAC Module)

FUNCTIONS

FEATURES

DIMENSION

FUNCTIONAL DIAGRAM

SPECIFICATIONS

TUTORIAL

More Documents

FAQ

```
#include <DFRobot_GP8XXX.h>

DFRobot_GP8503 GP8503;

void setup() {

    Serial.begin(9600);

    while(GP8503.begin()!=0){
        Serial.println("Communication with the device has encountered a failure. Please verify th
        delay(1000);
    }

    /**
     * @brief. Configuring different channel outputs for DAC values
     * @param data. Data values corresponding to voltage values
     * @n (0 - 4095).This module is a 12-bit precision DAC module, hence the values ranging fro
     * @param channel Output Channel
     * @n 0:Channel 0
     * @n 1:Channel 1
     * @n 2:AII channels
     */
    GP8503.setDACOutVoltage(2654,0);//At 0-2.5V voltage range, Channel 0 outputs 1.62V, whereas
    GP8503.setDACOutVoltage(1095,1);//At 0-2.5V voltage range, Channel 1 outputs 0.668V, wherea

    delay(1000);

    //The set voltage is saved internally in the chip for power-off retention.
    //GP8503.store();
}

void loop() {
```

```
}
```

INTRODUCTION

DFR1034-GP8503 (2-Channel 12bit I2C to 0-2.5V/VCC DAC Module)

FUNCTIONS

FEATURES

DIMENSION

FUNCTIONAL DIAGRAM

SPECIFICATIONS

TUTORIAL

More Documents

FAQ

RESULT

After downloading the program, the measured output voltage of channel 0 under the 0-2.5V state is 1.62V, and the output voltage of channel 1 is 0.668V. Under the 0-VCC state, the actual output voltage of channel 0 is 3.23V, and the output voltage of channel 1 is 1.334V.

More Documents

DFR1034 Documents:

DFR1034-Schematics.pdf

(<https://dfimg.dfrobot.com/60c1e008bddfc41c3293de80/wiki/25c6151576a9615c903c53cc3b05b29b.pdf>)

DFR1034_Dimensions.pdf

(<https://dfimg.dfrobot.com/60c1e008bddfc41c3293de80/wiki/b4d0c8fdbf8ec96b9201aab3d711bdcb.pdf>)

DFR1034_3D文件.rar

(<https://dfimg.dfrobot.com/60c1e008bddfc41c3293de80/wiki/60a1001502cac3404e76966623458eca.rar>)

DFR1034_2D_CAD File.rar

(<https://dfimg.dfrobot.com/60c1e008bddfc41c3293de80/wiki/e2556b2a4abc10a4f24bde527aa483cb.rar>)

DFR1034_GP8503 Datasheet.pdf

(<https://dfimg.dfrobot.com/60c1e008bddfc41c3293de80/wiki/fbec57cef0a201a91ee0bb8d22dd7456.pdf>)

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INTRODUCTION

DFR1034-GP8503 (2-Channel 12bit I2C to 0-2.5V/VCC DAC Module)

FUNCTIONS

FEATURES

DIMENSION

FUNCTIONAL DIAGRAM

SPECIFICATIONS

TUTORIAL

More Documents

FAQ

FAQ

For any questions, advice or cool ideas to share, please visit the **DFRobot Forum** (<https://www.dfrobot.com/forum/>).

 Get **2-Channel I2C to 0-10V DAC Module** (<https://www.dfrobot.com/product-2754.html>) from DFRobot Store or **DFRobot Distributor**. (<https://www.dfrobot.com/distributor>)

Turn to the Top

