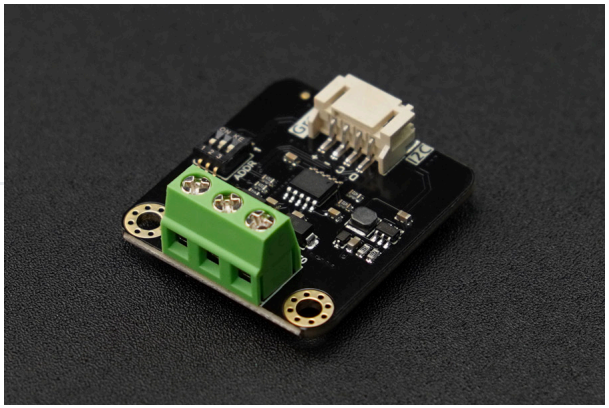
SKU:DFR1073 (https://www.dfrobot.com/product-2756.html)

INTRODUCTION
DFR1073-GP8413 (2-Channel 15-bit I2C to 0-5V/10V DAC Module)
FUNCTIONS
FEATURES
DIMENSION
FUNCTIONAL DIAGRAM
SPECIFICATIONS
TUTORIAL
More Documents
FAQ

(https://www.dfrobot.com/product-2756.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
DFR1073–GP8413 (2–Channel 15–bit I2C to 0–5V/10V 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:

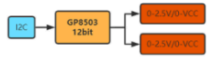
- Laboratory testing equipment
- Automatic motor speed control
- Indoor and outdoor lighting control
- Automated volume adjustment
- Backlight control for displays

  etc.

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

INTRODUCTION
DFR1073–GP8413（2–Channel 15–bit I2C to 0–5V/10V DAC Module)
FUNCTIONS
FEATURES
DIMENSION
FUNCTIONAL DIAGRAM
SPECIFICATIONS
TUTORIAL
More Documents
FAQ

0-2.5V/VCC Product

SKU	Name	Chip modle	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 modle	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 andprecision,expandable up to 8 modules throughcascading.
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 modle	Functional Diagram	Number of Channels	Output	Input	Resolution	Linearity error	Product Features
DFR0972	1-channel I2C转4-20mA	GP8302		1	0-20mA	I2C	12bit	0.10%	More stable current signal.

DFR1073-GP8413（2-Channel 15-bit I2C to 0-5V/10V DAC Module)

FUNCTIONS

This is a 2-channel DAC module with I2C communication, a resolution of 15-bit, and 0.01% output voltage linearity error, capable of generating analog voltage outputs of 0-10V or 0-5V. The 0-10V or 0-5V voltage range is a standard driving method. It can be widely used in automation applications such as light adjustment, frequency converters, valve regulation, and pump control. This product can drive a variety of 0-10V or 0-5V controlled devices available in the market through Arduino programming.

INTRODUCTION
DFR1073–GP8413（2–Channel 15–bit I2C to 0–5V/10V DAC Module）
FUNCTIONS
FEATURES
DIMENSION
FUNCTIONAL DIAGRAM
SPECIFICATIONS
TUTORIAL
More Documents
FAQ

The high precision and resolution of this module make it suitable for control scenarios that require higher signal accuracy, such as fine speed control or angle control.

The module features an onboard I2C address selection switch, allowing for the configuration of eight different I2C addresses. By cascading through I2C, it can be expanded to support 16 output channels.

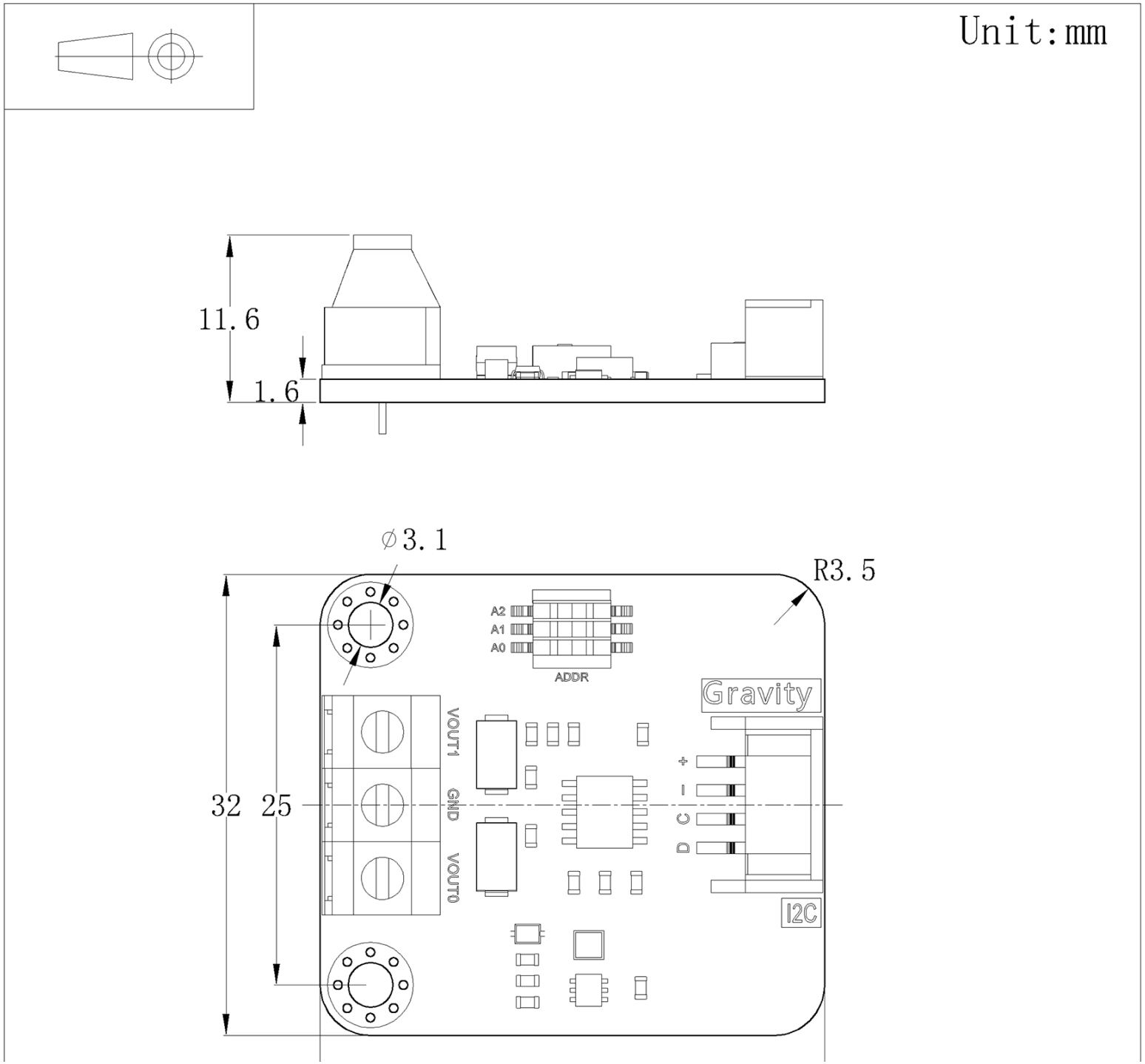
FEATURES

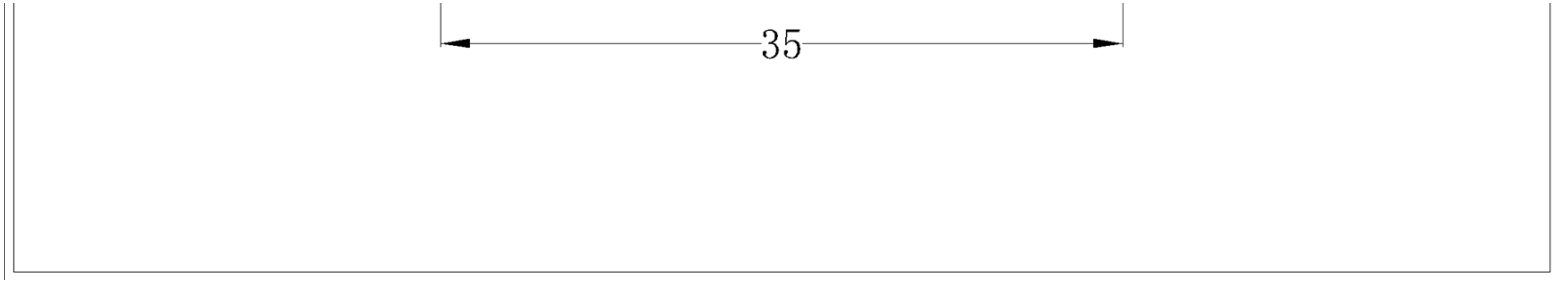
- Support 3.3V-5V power supply.
- Output voltage linearity error of 0.01%.
- Two channels of voltage output, either 0-5V or 0-10V, enabling connection and control of standard analog voltage devices.
- Gravity interface, I2C communication, Arduino control, suitable for program automation control.
- Features 8 adjustable I2C addresses, allowing simultaneous control of up to 16 devices.
- The high precision and resolution of this module make it suitable for control scenarios that require higher signal accuracy.

INTRODUCTION
DFR1073-GP8413 (2-Channel 15-bit I2C to 0-5V/10V DAC Module)
FUNCTIONS
FEATURES
DIMENSION
FUNCTIONAL DIAGRAM
SPECIFICATIONS
TUTORIAL
More Documents
FAQ

DIMENSION

INTRODUCTION
DFR1073-GP8413 (2-Channel 15-bit I2C to 0-5V/10V DAC Module)
FUNCTIONS
FEATURES
DIMENSION
FUNCTIONAL DIAGRAM
SPECIFICATIONS
TUTORIAL
More Documents
FAQ





INTRODUCTION

DFR1073-GP8413 (2-Channel 15-bit I2C to 0-5V/10V DAC Module)

FUNCTIONS

FEATURES

DIMENSION

FUNCTIONAL DIAGRAM

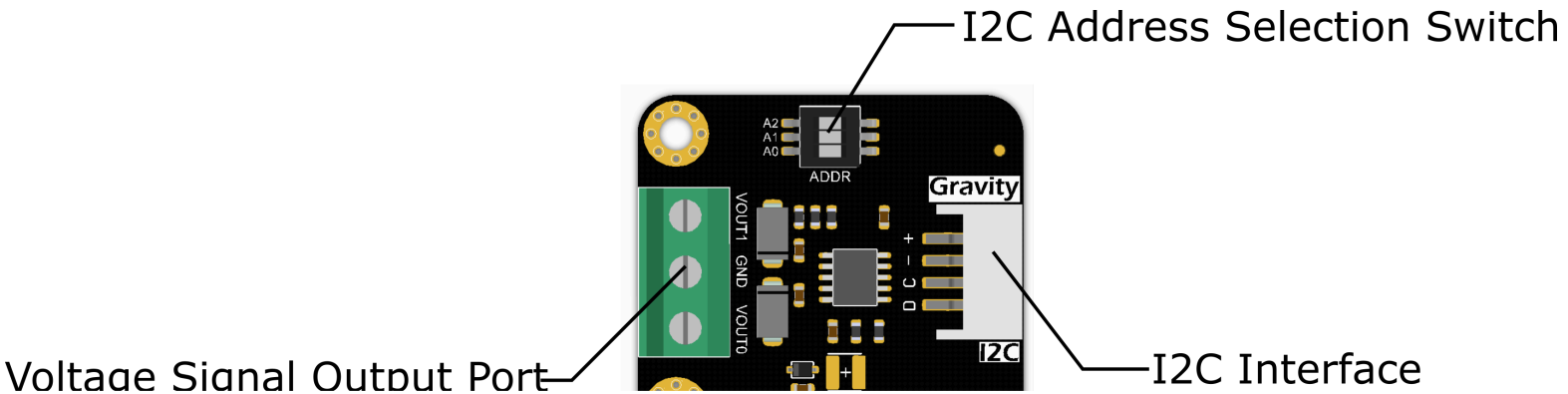
SPECIFICATIONS

TUTORIAL

More Documents

FAQ

FUNCTIONAL DIAGRAM



Name	Description	Remarks
I2C Interface	+	Positive terminal of the power supply (3.3V-5V)
	-	Negative terminal of the power supply
	C	SCL
	D	SDA
I2C Address Selection Switch		Address switching for I2C, refer to the demonstration code for address information

INTRODUCTION
DFR1073–GP8413（2–Channel 15–bit I2C to 0–5V/10V DAC Module）
FUNCTIONS
FEATURES
DIMENSION
FUNCTIONAL DIAGRAM
SPECIFICATIONS
TUTORIAL
More Documents
FAQ

Name	Description	Remarks
Voltage Signal Output Port	VOUT0	Positive terminal of output voltage signal 0
	VOUT1	Positive terminal of output voltage signal 1
	GND	Negative terminal of the output voltage signal

SPECIFICATIONS

- Chip Type: GP8413
- Operating Voltage: 3.3V-5V
- Output Voltage: 0-5V or 0-10V
- Number of Channels: 2 channels
- Communication Method: I2C
- Resolution: 15-bit
- Value Range: 0 - 32767 corresponding to 0-5V or 0-10V
- Output voltage linearity error: 0.01%

TUTORIAL

In this example, we will demonstrate the generation of different voltage values on two channels.

Input signal value range: 0-32767

Channel 0: Input value of 21457, resulting in an output voltage of 6.548V

Channel 1: Input value of 3210, resulting in an output voltage of 0.979V.

INTRODUCTION
DFR1073–GP8413 (2–Channel 15–bit I2C to 0–5V/10V DAC Module)
FUNCTIONS
FEATURES
DIMENSION
FUNCTIONAL DIAGRAM
SPECIFICATIONS
TUTORIAL
More Documents
FAQ

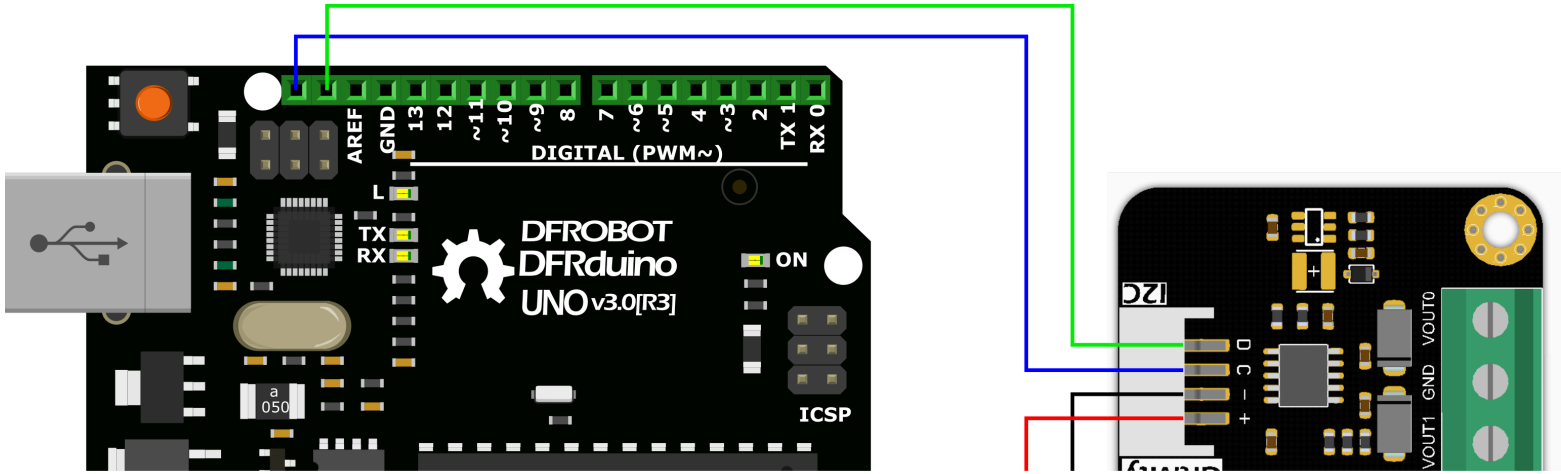
SOFTWARE REQUIREMENTS

- 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.

HARDWARE CONNECTION



INTRODUCTION
DFR1073-GP8413 (2-Channel 15-bit I2C to 0-5V/10V DAC Module)
FUNCTIONS
FEATURES
DIMENSION
FUNCTIONAL DIAGRAM
SPECIFICATIONS
TUTORIAL
More Documents
FAQ

SAMPLE CODE

```
#include <DFRobot_GP8XXX.h>
/**************************
---------------------------
| A0 |  A1 | A2 | i2c_addr |
---------------------------
| 0  |  0  | 0  |   0x58   |
---------------------------
| 1  |  0  | 0  |   0x59   |
---------------------------
| 0  |  1  | 0  |   0x5A   |
---------------------------
| 1  |  1  | 0  |   0x5B   |
---------------------------
| 0  |  0  | 1  |   0x5C   |
---------------------------
| 1  |  0  | 1  |   0x5D   |
---------------------------
| 0  |  1  | 1  |   0x5E   |
---------------------------
| 1  |  1  | 1  |   0x5F   |
---------------------------
**************************/
DFRobot_GP8413 GP8413(/*deviceAddr=*/0x58);

void setup() {

  Serial.begin(9600);

  while(GP8413.begin()!=0){
    Serial.println("Communication with the device has encountered a failure. Please verify th
    delay(1000);
  }
```

INTRODUCTION
DFR1073-GP8413 (2-Channel 15-bit I2C to 0-5V/10V DAC Module)
FUNCTIONS
FEATURES
DIMENSION
FUNCTIONAL DIAGRAM
SPECIFICATIONS
TUTORIAL
More Documents
FAQ

```
  /**
   * @brief. Setting the range of DAC output.
   * @param range. the range of DAC output.
   * @n     eOutputRange5V(0-5V)
   * @n     eOutputRange10V(0-10V)
   */
  GP8413.setDACOutRange(GP8413.eOutputRange10V);

  /**
   * @brief. Configuring different channel outputs for DAC values
   * @param data. Data values corresponding to voltage values
   * @n  (0 - 32767) .This module is a 15-bit precision DAC module, hence the values ranging f
   * @param channel. Output channels
   * @n  0:channel 0
   * @n  1:channel 1
   * @n  2:All channels
   */
  GP8413.setDACOutVoltage(21457,0);//channel 0 output 6.548V
  GP8413.setDACOutVoltage(3210,1);//channel 1 output 0.979V

  delay(1000);

  //The set voltage is saved internally in the chip for power-off retention.
  //GP8413.store();
}

void loop() {

}
```

RESULT

After downloading the program, the actual output voltage of channel 0 was measured as 6.548V, while the output voltage of channel 1 was measured as 0.979V using a voltmeter.

INTRODUCTION
DFR1073-GP8413 (2-Channel 15-bit I2C to 0-5V/10V DAC Module)
FUNCTIONS
FEATURES
DIMENSION
FUNCTIONAL DIAGRAM
SPECIFICATIONS
TUTORIAL
More Documents
FAQ

More Documents

DFR1073 Documents:

DFR1073-Schematics.pdf
(https://dfimg.dfrobot.com/60c1e008bddfc41c3293de80/wiki/e58fbf4673d0b29ca3a601a3d94c737a.pdf)

DFR1073_Dimensions.pdf
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DFR1073_GP8413 Datasheet.pdf
(https://dfimg.dfrobot.com/60c1e008bddfc41c3293de80/wiki/56397a22232d7e06df627ec8a688539a.pdf)

FAQ

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

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Turn to the Top

INTRODUCTION
DFR1073-GP8413 (2-Channel 15-bit I2C to 0-5V/10V DAC Module)
FUNCTIONS
FEATURES
DIMENSION
FUNCTIONAL DIAGRAM
SPECIFICATIONS
TUTORIAL
More Documents
FAQ