DATA SHEET ARDUINO UNO R3

Arduino Uno

Overview

The Arduino Uno is a microcontroller board based on the ATmega328 (datasheet). It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz ceramic resonator, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started.

The Uno differs from all preceding boards in that it does not use the FTDI USB-to-serial driver chip. Instead, it features the Atmega16U2 (Atmega8U2 up to version R2) programmed as a USB-to-serial converter.

Revision 2 of the Uno board has a resistor pulling the 5V HVB line to ground, making it easier to put into DFU mode.

Revision 1 of the board has the following new features:

- 1.0 pinout: added SDA and SCL pins that are near to the AREF pin and two other new pins placed near to the RESET pin, the IOREF that allow the shields to adapt to the voltage provided from the board. In future, shields will be compatible both with the board that use the AVR, which operate with 5V and with the Arduino Due that operate with 3.3V. The second one is a not connected pin, that is reserved for future purposes.
- Stronger RESET circuit.
- Atmega 16U2 replace the 8U2.

"Uno" means one in Italian and is named to mark the upcoming release of Arduino 1.0. The Uno and version 1.0 will be the reference versions of Arduino, moving forward. The Uno is the latest in a series of USB Arduino boards, and the reference model for the Arduino platform; for a comparison with previous versions, see the index of Arduino boards.

Summary

<table>
<thead>
<tr>
<th>Microcontroller</th>
<th>ATmega328</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating Voltage</td>
<td>5V</td>
</tr>
<tr>
<td>Input Voltage (recommended)</td>
<td>7-12V</td>
</tr>
<tr>
<td>Specification</td>
<td>Value</td>
</tr>
<tr>
<td>------------------------</td>
<td>--------------------------------------------</td>
</tr>
<tr>
<td>Input Voltage (limits)</td>
<td>6-20V</td>
</tr>
<tr>
<td>Digital I/O Pins</td>
<td>14 (of which 6 provide PWM output)</td>
</tr>
<tr>
<td>Analog Input Pins</td>
<td>6</td>
</tr>
<tr>
<td>DC Current per I/O Pin</td>
<td>40 mA</td>
</tr>
<tr>
<td>DC Current for 3.3V Pin</td>
<td>50 mA</td>
</tr>
<tr>
<td>Flash Memory</td>
<td>32 KB (ATmega328) of which 0.5 KB used by bootloader</td>
</tr>
<tr>
<td>SRAM</td>
<td>2 KB (ATmega328)</td>
</tr>
<tr>
<td>EEPROM</td>
<td>1 KB (ATmega328)</td>
</tr>
<tr>
<td>Clock Speed</td>
<td>16 MHz</td>
</tr>
</tbody>
</table>

### Schematic & Reference Design

EAGLE files: [arduino-uno-Rev3-reference-design.zip](#) (NOTE: works with Eagle 6.0 and newer)

Schematic: [arduino-uno-Rev3-schematic.pdf](#)

**Note:** The Arduino reference design can use an Atmega8, 168, or 328, Current models use an ATmega328, but an Atmega8 is shown in the schematic for reference. The pin configuration is identical on all three processors.

### Power

The Arduino Uno can be powered via the USB connection or with an external power supply. The power source is selected automatically.

External (non-USB) power can come either from an AC-to-DC adapter (wall-wart) or battery. The adapter can be connected by plugging a 2.1mm center-positive plug into the board's power jack. Leads from a battery can be inserted in the Gnd and Vin pin headers of the POWER connector.

The board can operate on an external supply of 6 to 20 volts. If supplied with less than 7V, however, the 5V pin may supply less than five volts and the board may be unstable. If using more than 12V, the voltage regulator may overheat and damage the board. The recommended range is 7 to 12 volts.

The power pins are as follows:

- **VIN.** The input voltage to the Arduino board when it's using an external power source (as opposed to 5 volts from the USB connection or other regulated power source). You can supply voltage through this pin, or, if supplying voltage via the power jack, access it through this pin.
- **5V.** This pin outputs a regulated 5V from the regulator on the board. The board can be supplied with power either from the DC power jack (7 - 12V), the USB connector (5V), or the VIN pin of the board (7-12V). Supplying voltage via the 5V or 3.3V pins bypasses the regulator, and can damage your board. We don't advise it.
- **3.3V.** A 3.3 volt supply generated by the on-board regulator. Maximum current draw is 50 mA.
- **GND.** Ground pins.
DATA SHEET LDR

Light Dependent Resistor - LDR

Two cadmium sulphide(ods) photoconductive cells with spectral responses similar to that of the human eye. The cell resistance falls with increasing light intensity. Applications include smoke detection, automatic lighting control, batch counting and burglar alarm systems.

Applications

Photoconductive cells are used in many different types of circuits and applications.

Analog Applications
- Camera Exposure Control
- Auto Slide Focus - dual cell
- Photocopy Machines - density of toner
- Colorimetric Test Equipment
- Densitometer
- Electronic Scales - dual cell
- Automatic Gain Control – modulated light source
- Automated Rear View Mirror

Digital Applications
- Automatic Headlight Dimmer
- Night Light Control
- Oil Burner Flame Out
- Street Light Control
- Absence / Presence (beam breaker)
- Position Sensor

Electrical Characteristics

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Conditions</th>
<th>Min</th>
<th>Typ</th>
<th>Max</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cell resistance</td>
<td>1000 LUX</td>
<td>-</td>
<td>400</td>
<td>-</td>
<td>Ohm</td>
</tr>
<tr>
<td></td>
<td>10 LUX</td>
<td>-</td>
<td>9</td>
<td>-</td>
<td>K Ohm</td>
</tr>
<tr>
<td>Dark Resistance</td>
<td>-</td>
<td>-</td>
<td>3.5</td>
<td>-</td>
<td>M Ohm</td>
</tr>
<tr>
<td>Dark Capacitance</td>
<td>-</td>
<td>-</td>
<td>2.8</td>
<td>-</td>
<td>pF</td>
</tr>
<tr>
<td>Rise Time</td>
<td>1000 LUX</td>
<td>-</td>
<td>2.8</td>
<td>-</td>
<td>ms</td>
</tr>
<tr>
<td></td>
<td>10 LUX</td>
<td>-</td>
<td>18</td>
<td>-</td>
<td>ms</td>
</tr>
<tr>
<td>Fall Time</td>
<td>1000 LUX</td>
<td>-</td>
<td>48</td>
<td>-</td>
<td>ms</td>
</tr>
<tr>
<td></td>
<td>10 LUX</td>
<td>-</td>
<td>120</td>
<td>-</td>
<td>ms</td>
</tr>
<tr>
<td>Voltage AC/DC Peak</td>
<td>-</td>
<td>-</td>
<td>320</td>
<td>V max</td>
<td></td>
</tr>
<tr>
<td>Current</td>
<td>-</td>
<td>-</td>
<td>75</td>
<td>mA max</td>
<td></td>
</tr>
<tr>
<td>Power Dissipation</td>
<td>-</td>
<td>-</td>
<td>100</td>
<td>mW max</td>
<td></td>
</tr>
<tr>
<td>Operating Temperature</td>
<td>-90</td>
<td>-</td>
<td>+75</td>
<td>Deg. C</td>
<td></td>
</tr>
</tbody>
</table>
DATA SHEET STEP DOWN

LM2596 SIMPLE SWITCHER® Power Converter 150-kHz
3-A Step-Down Voltage Regulator

1 Features
- 3.3-V, 5-V, 12-V, and Adjustable Output Versions
- Adjustable Version Output Voltage Range: 1.2-V to 37-V ± 4% Maximum Over Line and Load Conditions
- Available in TO-220 and TO-263 Packages
- 3-A Output Load Current
- Input Voltage Range Up to 40 V
- Requires Only 4 External Components
- Excellent Line and Load Regulation Specifications
- 150-kHz Fixed-Frequency Internal Oscillator
- TTL Shutdown Capability
- Low Power Standby Mode, I_{SO} Typically 80 μA
- High Efficiency
- Uses Readily Available Standard Inductors
- Thermal Shutdown and Current-Limit Protection
- Create a Custom Design Using the LM2596 with the WEBENCH Power Designer

2 Applications
- Simple High-Efficiency Step-Down (Buck) Regulator
- On-Card Switching Regulators
- Positive to Negative Converter

3 Description
The LM2596 series of regulators are monolithic integrated circuits that provide all the active functions for a step-down (buck) switching regulator, capable of driving a 3-A load with excellent line and load regulation. These devices are available in fixed output voltages of 3.3 V, 5 V, 12 V, and an adjustable output version.

Requiring a minimum number of external components, these regulators are simple to use and include internal frequency compensation, and a fixed-frequency oscillator.

The LM2596 series operates at a switching frequency of 150 kHz, thus allowing smaller sized filter components than what would be required with lower frequency switching regulators. Available in a standard 7-pin TO-220 package with several different lead bend options, and a 7-pin TO-263 surface mount package.

Device Information

<table>
<thead>
<tr>
<th>PART NUMBER</th>
<th>PACKAGE</th>
<th>BODY SIZE (NOM)</th>
</tr>
</thead>
<tbody>
<tr>
<td>LM2596</td>
<td>TO-220</td>
<td>14.088 mm × 10.18 mm</td>
</tr>
<tr>
<td></td>
<td>TO-263</td>
<td>10.10 mm × 8.89 mm</td>
</tr>
</tbody>
</table>

(1) For all available packages, see the orderable addendum at the end of the data sheet.
1. Introduction

Prior to driving an LED, which is a kind of semiconductor product, it is necessary to thoroughly comprehend its properties. For instance, fluctuation of the forward voltage $V_f$ on an LED causes steep variations in the forward current if. In the case of Fig. 1, if the temperature conditions are constant, a 10% rise in $V_f$ results in an increase of $I_f$ by more than 40%.

Fluctuations in the forward current have a significant effect on light emission, heat generation, and other phenomena on LEDs. Especially regarding high-output lighting LEDs driven by large current, strict control of the forward current is important. In addition, the forward voltage fluctuates due to temperature, and measures for heat release are therefore a crucial factor.

Thus, when driving our LEDs, be sure to read the specifications and application notes for the relevant products and take measures according to their properties.

2. Constant current driving system (recommended)

Even under the condition that the forward voltage fluctuates due to heat generation or other reasons, the constant current driving system supplies a certain current to LEDs and allows relatively stable driving under varying environmental conditions.

In general, as shown in the example of Fig. 2, the forward voltage to apply constant current to an LED tends to decrease as the temperature increases.

We recommend the constant current driving system with the object of stable light-emitting output and reliability.

3. Constant voltage driving system

As mentioned above, the forward voltage to apply constant current to an LED tends to decrease as the temperature increases. In the case of Fig. 2, when the case temperature $T_c$ is 90°C, the same amount of current is achieved by the approx. 5% lower forward voltage than at $T_c = 25$°C. If constant voltage driving is provided under these conditions, comparative overvoltage and overcurrent driving status is possible.

If constant voltage driving is employed, assume the temperature in actual usage and implement appropriate measures to limit the current.

4. Precautions on Inrush current

If an LED is connected to capacitive loads, such as capacitors, an instantaneous Inrush current may occur when the system is turned on/off. (For instance, when the secondary side of a power supply circuit in the energized state is turned on/off.) Avoid any possible occurrence of Inrush current. If it is unavoidable, implement measures so that the absolute maximum rating of the LED will not be exceeded.
1. Introduction
This document describes SIM800L hardware interface in great detail. This document will help user to quickly understand SIM800L interface specifications, electrical and mechanical details. With the help of this document and other SIM800L application notes, user guide, users can use SIM800L to design various applications quickly.

2. SIM800L Overview
SIM800L is a quad-band GSM/GPRS module, that works on frequencies GSM900MHz, EGSM1800MHz, DCS1800MHz and PCS1900MHz. SIM800L features GPRS multi-slot class 12/ class 10 (optional) and supports the GPRS coding schemes CS-1, CS-2, CS-3 and CS-4.

With a tiny configuration of 15.8*17.8*2.4mm, SIM800L can meet almost all the space requirements in user applications, such as smart phones, PDA and other mobile devices.

SIM800L has 38pin pads of LGA packaging, and provides all hardware interfaces between the module and customers’ boards.
- Support 5*5*2 keypads
- One full mode serial port, user can configure two serial ports.
- One USB, the USB interfaces can debug, download software.
- Audio channel which includes two microphone input, a receiver output and a speaker output
- Programmable general purpose input and output.
- A SIM card interface
- Support FM
- Support one PWM

SIM800L is designed with power saving technique so that the current consumption is as low as 0.7mA in sleep mode.

2.1. SIM800L Key Features
Table 1: SIM800L Key Features

<table>
<thead>
<tr>
<th>Feature</th>
<th>Implementation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power supply</td>
<td>3.4V~4.4V</td>
</tr>
<tr>
<td>Power saving</td>
<td>Typical power consumption in sleep mode is 0.7mA (AT+CFUN=0)</td>
</tr>
<tr>
<td>Frequency bands</td>
<td>Quad-band: GSM 850, EGSM 900, DCS 1800, PCS 1900. SIM800L can search the 4 frequency bands automatically. The frequency bands can also be set by AT command “AT+CFAND”. For details, please refer to document [1]. Compliant to GSM Phase 2/2+</td>
</tr>
<tr>
<td>Transmitting power</td>
<td>Class 4 (2W) at GSM 850 and EGSM 900</td>
</tr>
<tr>
<td></td>
<td>Class 1 (1W) at DCS 1800 and PCS 1900</td>
</tr>
<tr>
<td>GPRS connectivity</td>
<td>GPRS multi-slot class 12 (default)</td>
</tr>
<tr>
<td></td>
<td>GPRS multi-slot class 1-12 (option)</td>
</tr>
<tr>
<td>Temperature range</td>
<td>Normal operation: -40°C ~ +85°C</td>
</tr>
</tbody>
</table>
#include <SoftwareSerial.h>

SoftwareSerial SIM800L(2,3); // RX, TX

byte ldr= A0;
byte led= 13;
int nilai;

void setup(){
    pinMode(led, OUTPUT);
    // setting baud rate serial monitor
    Serial.begin(9600);
    while (!Serial);

    // setting baud rate sim 800L
    Serial.println("Inisialisasi modul SIM800L");
    SIM800L.begin(115200);
    delay(1000);
}

void kirimSMS(){
    // setting baud rate serial monitor
    Serial.begin(9600);
    while (!Serial);
// setting baud rate sim 800l
Serial.println("Inisialisasi modul SIM800L");
SIM800L.begin(115200);
delay(1000);

// ------------------ Mulai Mengirim SMS ------------------- //
Serial.println("Tes Uji Coba Kirim SMS...");
// setting ke mode teks untuk pengiriman sms
SIM800L.write("AT+CMGF=1\r\n");
delay(1000);
// setting nomor tujuan
SIM800L.write("AT+CMGS="083867970565\r\n"); // no tujuan sms
delay(1000);
// setting isi teks sms
SIM800L.write("Sensor Mendeteksi Cahaya, Mematikan Lampu"); // teks isi sms
delay(1000);
// mengirim char ctrl+z/esc untuk keluar dari menu sms
SIM800L.write((char)26); // CTRL-Z
delay(1000);
Serial.println("SMS Telah dikirim!");
}

void kirimSMS2()
{
// setting baud rate serial monitor
Serial.begin(9600);
while (!Serial);

// setting baud rate sim 800l
Serial.println("Inisialisasi modul SIM800L");
SIM800L.begin(115200);
delay(1000);

// ------------------ Mulai Mengirim SMS ------------------- //
Serial.println("Tes Uji Coba Kirim SMS...");

// setting ke mode teks untuk pengiriman sms
SIM800L.write("AT+CMGF=1\r\n");
delay(1000);

// setting nomor tujuan
SIM800L.write("AT+CMGS="083867970565"\r\n"); // no tujuan sms
delay(1000);

// setting isi teks sms
SIM800L.write("Sensor Tidak Mendeteksi Cahaya, Menyalakan Lampu"); // teks isi sms
delay(1000);

// mengirim char ctrl+z/esc untuk keluar dari menu sms
SIM800L.write((char)26); // CTRL-Z
delay(1000);
Serial.println("SMS Telah dikirim!");

void loop(){
    nilai= analogRead(ldr);
Serial.print("Nilai LDR: ");
Serial.println(nilai);
if(nilai < 420){
digitalWrite(led, HIGH);
kirimSMS2();
delay(21000);}
else{
digitalWrite(led, LOW);
kirimSMS();
delay(16000);
}
### DAFTAR KOMPONEN DAN HARGA KOMPONEN

<table>
<thead>
<tr>
<th>No</th>
<th>Komponen</th>
<th>Harga</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Arduino Uno R3</td>
<td>Rp 65.000,00</td>
</tr>
<tr>
<td>2</td>
<td>Adapter 9 Volt</td>
<td>Rp 26.000,00</td>
</tr>
<tr>
<td>3</td>
<td>Kabel Jumper 10 Buah Male-Female</td>
<td>Rp 9.500,00</td>
</tr>
<tr>
<td>4</td>
<td>Kertas Karton 2 Lembar</td>
<td>Rp 18.000,00</td>
</tr>
<tr>
<td>5</td>
<td>SIM 800L</td>
<td>Rp 63.000,00</td>
</tr>
<tr>
<td>6</td>
<td>LM2596 DC-DC Stepdown</td>
<td>Rp 10.500,00</td>
</tr>
<tr>
<td>7</td>
<td>Sensor LDR</td>
<td>Rp 5.000,00</td>
</tr>
<tr>
<td>8</td>
<td>Resistor Dan Led 10 Buah</td>
<td>Rp 11.000,00</td>
</tr>
<tr>
<td>9</td>
<td>Lem Fox</td>
<td>Rp 12.000,00</td>
</tr>
<tr>
<td>10</td>
<td>Cat Kuda Tebang 3 warna</td>
<td>Rp 36.000,00</td>
</tr>
<tr>
<td>11</td>
<td>Kuas Cat</td>
<td>Rp 5.000,00</td>
</tr>
<tr>
<td>12</td>
<td>Tinol Dan Solder</td>
<td>Rp 72.000,00</td>
</tr>
<tr>
<td>13</td>
<td>Multimeter dan Pcb</td>
<td>Rp 42.000,00</td>
</tr>
<tr>
<td></td>
<td><strong>Total Harga</strong></td>
<td><strong>Rp 370.500,00</strong></td>
</tr>
</tbody>
</table>
FOTO ALAT