DONYX

donyx.com

User's guide

Router Donyx
RX54x2 5G RedCap

Table of contents

1. Specifications Sheet

This document applies to Router Donyx RX54x2 5G RedCap.

Document revision 07.05.2025.

2. General Information

This industrial-grade 5G router supports 5G NR (New Radio), delivering download speeds of up to 220 Mbps and upload speeds of up to 120 Mbps per module. With dual modules, the router ensures resilient connectivity through automatic failover and load balancing, providing seamless operation and minimizing downtime. Dual-SIM functionality ensures connection redundancy and allows for scheduled operation.

The router offers a comprehensive range of wired and wireless connectivity options. These include an integrated 802.11b/g/n Wi-Fi access point, four 10/100/1000 Ethernet ports, RS-232 and RS-485 serial interfaces, and seven configurable GPIO pins offering maximum flexibility for integration with external devices.

Powered by a high-performance MIPS processor, the router runs custom firmware based on OpenWRT 19. This open-source platform allows for customization and future feature enhancements. Robust security is provided through advanced encryption protocols and a comprehensive firewall.

The router supports a full suite of networking features, including NAT, DHCP, DNS, DynDNS, SSH, TFTP, Wget, SNMP, VRRP, VLAN, NTP, and optional dynamic routing.

Designed for demanding industrial environments, the router features seamless WAN failover and a wide operating temperature range of -40°C to +65°C. This versatile connectivity solution is ideal for applications ranging from remote network connectivity and industrial control systems to secure data transmission for financial terminals and robust video surveillance deployments.

2.1. Cellular Standards

Table 1. Router Donyx RX54x2 5G RedCap Cellular Standards

Cellular Module	Quantity	5G	LTE	GPS
NR5 (RedCap)	2	Yes	Yes	Yes

Specifications may change without prior notice!

2.2. Hardware Specifications

Number of Cellular Modules	2 x NR5 (RedCap)
Processor	MIPS 24KEc 580 Mhz
Dynamic RAM	128 MB
Flash Memory Capacity	32 MB
Wi-Fi	2,4 GHz (802.11b/g/n 2T2R MAC)
WiFi Transmit Power	up to 16 dBm (40 mW)
Ethernet Connector	1 x 10/100 Mbps
SIM Card Slots	Mini SIM
Card slot	MicroSDHC
Microfit4 Connector	Power
Breakaway Terminal Connector	RS485, 7 x GPIO, power
DB9 connector	RS232
RST Button	Reset Button

2.3. Physical Specifications

- Maximum dimensions (including connectors): 135 × 120 × 40 mm
- Maximum weight: 300 g

2.4. Environmental Operating Ranges

- Enclosure Material: Aluminum
- Enclosure Protection Rating: IP30
- Operating Temperature Range: from -40°C to +65°C
- Storage Temperature Range: from -40 to 50°C
- Operating Humidity: from 10 to 80% noncondensing

2.5. Electrical Specifications

Power Supply Operating Characteristics:

- Power supply voltage from 8 to 30 V (DC)
- Current consumption, maximum:
  - At power supply voltage +12 V – 1000 mA;
  - At power supply voltage +24 V – 500 mA;
- Passive PoE-IN available on **Port 1**. Supported Passive PoE-IN voltage range : 8-30 V

GPIO 1-7 Mode Input:

- Voltage range for "0" (low level) — 0…0.3 V;
- Voltage range for "1" (high level) — 1.9 V…Vin;
- Maximum allowable input voltage — 30 V

GPIO 1-7 in Mode Output:

The maximum total load current across all GPO ports must not exceed 300 mA.

- Maximum output current for GPIO1 - GPIO7 — 100 mA per pin.

When using GPIO in output mode with a +12V supply voltage, the device’s power consumption increases by 300 mA. This should be considered when selecting a power supply.

2.6. Precautions

Restrictions on Router Usage Near Other Electronic Devices

- Power off the router in hospitals or in close proximity to medical devices (such as pacemakers, hearing aids, etc.). The router may cause interference with the operation of such equipment.
- Power off the router near gas stations, chemical plants, and blasting sites. The router may cause interference with the operation of equipment in these locations.
- Power off the router on aircraft and take measures to prevent accidental activation.
- At close range, the router may cause interference with the operation of televisions, radios, and other devices.

Environmental Protection

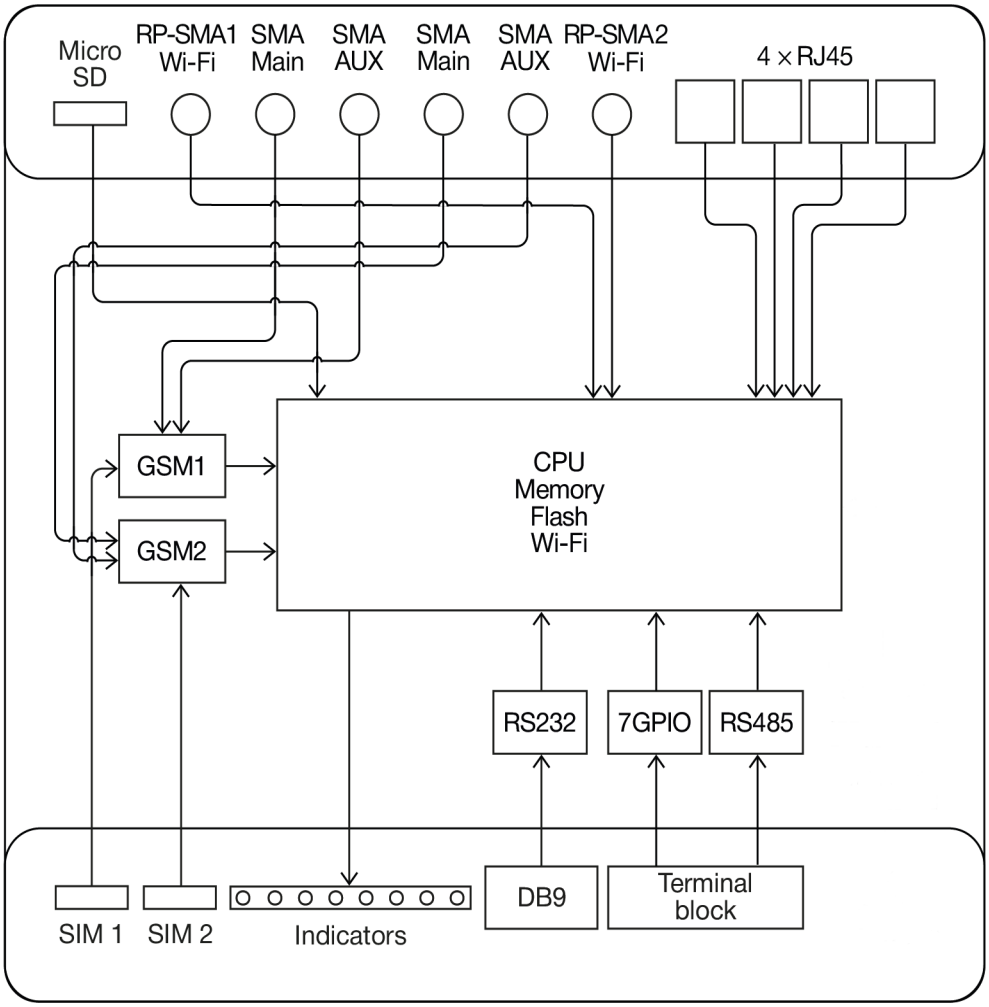
- Protect the router from dust and moisture.

Operational Considerations

- Adhere to permissible power supply and vibration standards at the device installation location.

2.7. Functional Diagram of the Device

The following diagram illustrates the main functional blocks of the router.



3. Device Exterior

3.1. External Interfaces and Ports

The following figures display the front and back views of the variants.

The rear views display ports, SIM slots and LEDs.

Figure 1. Front View

- **SIM 1 - SIM 2** - SIM Card Trays
- **GPIO, Vout, RS485** - Terminal Block Connector (RS485, GPI)
- **RS232** - DB9 connector (RS232)
- Router Status LEDs

The backviews display powersupply, ports, antenna connectors.

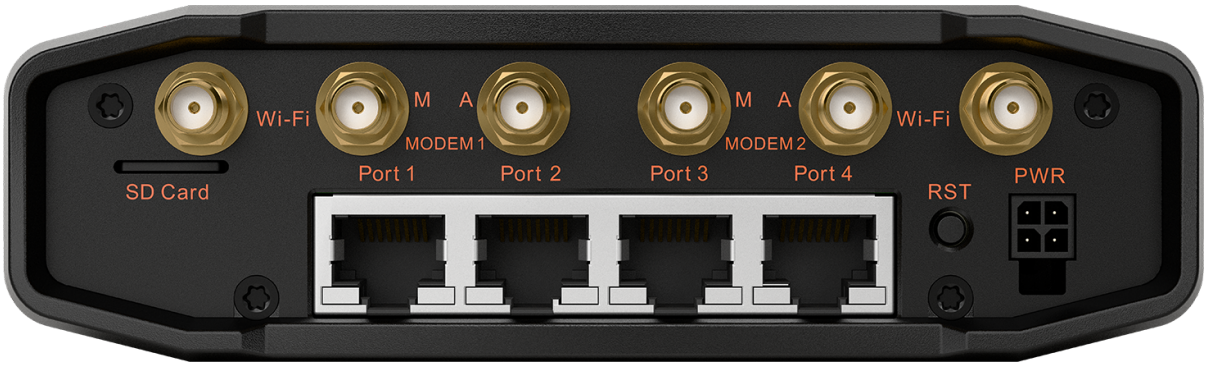


Figure 2. Back View

- **A** - Mobile **AUX** Antenna Connector (Additional, Receive Only)
- **M** - Mobile **Main** Antenna Connector (Primary, Transmit and Receive)
- **Wi-Fi** - RP-SMA Connectors for Wi-Fi Antenna
- **PWR** - Power Input Connector
- **RST** - Reset Button
- **PORTS 1-4** - Ethernet Network Ports
- **SD Card** - SD card slot

3.2. Power Input Connector

The Microfit4 power connector is used to connect the router to a power source.

The power source requirements are 8-30V DC, with a minimum current of 1A at 12V.

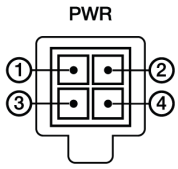


Figure 3. Power Connector

Table 2. Power Connector Pinout

Pin	Signal	Description
1	OPTO-	Optocoupler Negative
2	OPTO+	Optocoupler Positive
3	GND	Ground (Power Negative)
4	U+	Power Positive

3.3. Ethernet Network Ports

The Ethernet ports are used to connect local network devices and support speeds of 10/100/1000 Mbps.

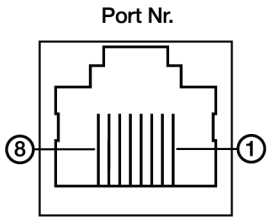


Figure 4. Ethernet Connector

Table 3. Ethernet Connector Pinout

Pin	Signal	Description
1	TX+	Transmit Positive
2	TX-	Transmit Negative
3	RX+	Receive Positive
4	VCC	Power Positive (Input or Output)
5	VCC	Power Positive (Input or Output)
6	RX-	Receive Negative
7	GND	Power Return (Input or Output)
8	GND	Power Return (Input or Output)

Port 1 supports Passive PoE.

3.4. Terminal Block Connector (RS485, GPI)

The terminal block connector provides access to the RS485 serial interface and General Purpose Input/Output (GPIO) lines.

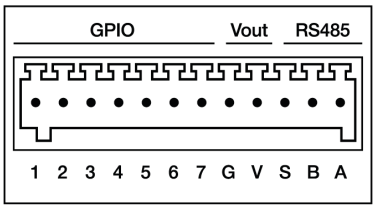


Figure 5. Interface Connector

Table 4. Interface Connector Pinout

Pin	Description
1	GPIO1
2	GPIO2
3	GPIO3
4	GPIO4
5	GPIO5
6	GPIO6
7	GPIO7
G	GND (Ground/Negative; voltage level depends on the router's power supply)
V	VOUT (Positive output voltage; level depends on the router's power supply)
S	Shield (For signal wire shielding)
B	RS485 Signal B
A	RS485 Signal A

Powering the Router and GPIO: Always power on the router before applying any voltage to the GPIO pins. Simultaneously applying power to both the router's power input and the GPIO pins is **PROHIBITED**. Failure to follow this instruction may damage the router and void your warranty.

V and G Pins: The **V** and **G** pins on the terminal block are not intended for powering the router. They lack reverse polarity and overvoltage protection.

3.5. DB9 connector (RS232)

The DB9 connector is used for connecting to the COM port via the RS232 interface.

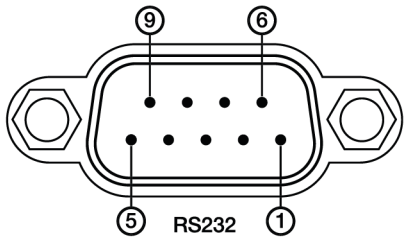


Figure 6. DB9 Connector (COM Port)

Table 5. DB9 Pinout

Pin	Signal	Description
1	RS232 - DCD	Data Carrier Detect
2	RS232 - RXD	Receive Data
3	RS232 - TXD	Transmit Data
4	RS232 - DTR	Data Terminal Ready
5	GND	Ground
6	RS232 - DSR	Data Set Ready
7	RS232 - RTS	Request To Send
8	RS232 - CTS	Clear To Send
9	RS232 - RI	Ring Indicator

The router supports remote access to external devices via the COM port using the TCP/IP protocol (RS232/RS485, Modbus TCP to RTU Server).

Connecting to the Serial Port: Connect devices to the router's serial port *only* when both devices are powered off.

3.6. Antenna Information

The router features the following antenna connectors:

Connector Type	Image	Purpose
2 x SMA Connectors		For cellular (Main) antenna
2 x SMA Connectors		For cellular (AUX) antenna
2 x RP-SMA Connectors		For Wi-Fi antennas

The **Main** antenna is the primary antenna and is used for both transmitting and receiving signals.

The **AUX** antenna is an auxiliary antenna and is used for receiving signals only.

The auxiliary antenna is recommended for use in environments with multipath propagation (e.g., dense urban areas) or in areas with high levels of signal noise. Using diversity reception with two antennas can improve signal quality and link stability in these challenging RF environments.

It is strongly recommended to use an antenna identical to the main antenna for the auxiliary port. Using dissimilar antennas for Main and AUX can degrade reception performance.

For installations deep within a building, in a basement or sub-basement, it is best to use an external antenna connected to the Main port. To minimize signal loss, the antenna cable length should not exceed 10 meters.

3.7. Reset button

The reset button can be used to reboot the router or restore it to factory default settings if access to the web interface or command-line interface is lost.

To reboot the device, press and hold the reset button for 3-8 seconds.

To restore factory default settings, press and hold the reset button for longer than 8 seconds.

Interrupting power to the router during a firmware upgrade or factory reset could render the device inoperable. Ensure that power is maintained throughout these processes.

3.8. Indicator Logic and Behavior

The router's indicators are located on the front panel.

PWR Power/Status Indicator	
❋ Blinking Green	Firmware update in progress
● Solid Green	Normal operation
○ Off	No power
SIM Card 1/2 Activity Indicators	
○ Off	SIM card is not in use
● Solid Green	SIM card is in use
Cellular Network Indicator	
● Solid Green	5G connection established
❋ Blinking Green	4G (LTE) connection established
● Solid Red	3G connection established (if supported)
❋ Blinking Red	Connecting to the network
○ Off	No connection established
Signal Strength Indicator	
● Solid Green	High signal strength (70-100%)
❋ Blinking Green	Medium signal strength (35-70%)
● Solid Red	Low signal strength (0-35%)
○ Off	No connection established
LINK Port 1-4 LAN Port Status Indicator	
● Solid Green	Cable connected
❋ Blinking Green	Data transmission in progress
○ Off	No cable connected

RS485/RS232 Port Status Indicator	
❋ Blinking Red	Data transmission in progress
❋ Blinking Green	Data reception in progress
○ Off	Interface not in use

Wi-Fi Indicators

Wi-Fi Indicator	
○ Off	Wi-Fi disabled
❋ Blinking Green	Wi-Fi data transmission in progress
● Solid Green	Wi-Fi enabled

4. Preparation and Connection

4.1. Connection

1. Connect the required antennas to their respective connectors. For proper operation, the M (Main) antennas must be connected.
2. Insert SIM cards into the designated SIM card trays.
3. Connect an Ethernet cable to the Ethernet ports (Port 1 … Port N, depending on the router model).
4. Connect the power adapter to the PWR connector.

   Allow the router sufficient time to boot. After 1-2 minutes, the PWR indicator will stop flashing, indicating that the router's operating system has successfully loaded. You can then connect to the router via its web interface.
5. Ensure that the IP address 192.168.1.1 is not in use on the local network and that the host computer is either configured to obtain an IP address automatically via DHCP, or has a static IP address assigned within the 192.168.1.0/24 subnet.
6. Open a web browser and enter http://192.168.1.1 in the address bar.
7. Log in using the default credentials: username root and password root.

4.2. SIM Card Installation

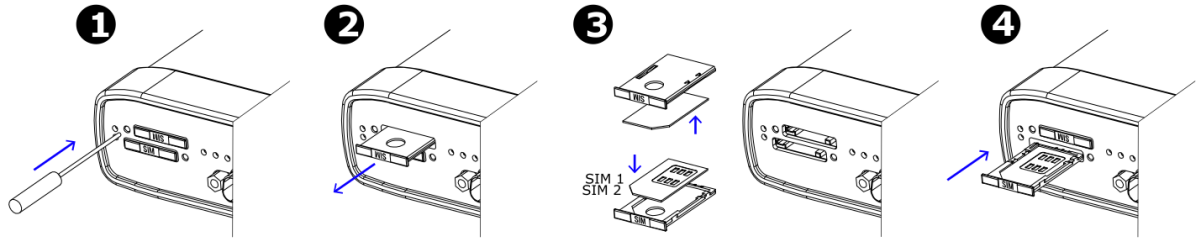


Figure 7. SIM Card Placement

1. Using a thin object, press the SIM tray eject button. The button is located to the right of the tray.
2. Remove the SIM tray.
3. Place the SIM card in the tray as shown in the diagram.
4. Insert the SIM tray into the router, ensuring it is properly aligned with the SIM holder guides.

SIM trays are inserted with the SIM card facing UP.

5. If the SIM tray is difficult to insert, it is likely misaligned with the guides. Carefully remove the tray and try again.

5. How to use

5.1. Local Network settings

This configuration assumes the router is connected to a PC via port3.

1. Releasing Ports from the Default Bridge:
   - Navigate to Network→Bridge→bridge0.
   - Remove port1, port2, and port4 from the bridge.
   - Apply and commit the changes.

Do not remove the port currently connected to your PC. This will result in loss of access to the router.

2. Creating a New Bridge:
   - Navigate to Network→Bridge.
   - Click "Add" to create a new bridge. Name the bridge lan.
   - Apply and commit the changes.
3. Adding Ports to the New Bridge:
   - Navigate to Network→Bridge→lan.
   - Add the desired ports to the bridge (e.g., port1).
   - Apply and commit the changes.
4. Configuring the IP Interface for the Bridge:
   - Navigate to IP→Interface.
   - Click "Add". From the dropdown menu, select the previously created bridge interface (lan). Set the type to static.
   - Navigate to the newly created interface IP→Interface→lan.
   - In the "IP Addresses" field, assign the desired IP address(es) to the interface. For example: 192.168.192.168/24.
   - Apply and commit the changes.

5.2. VLAN settings

This configuration example demonstrates how to create a VLAN interface, assign it to a physical port, and configure an IP address for the VLAN.

1. Creating the VLAN Interface:
   - Navigate to Network→Device.
   - Click "Add". In the resulting window, set the name (e.g., vlandev) and type to vlan.
2. Configuring the VLAN Interface:
   - Navigate to Network→Device→vlandev.
   - In the "Peer Device" field, specify the physical port to which the VLAN will be tagged (e.g., port 1).
   - In the "VID" field, assign the VLAN ID (e.g., 321).
3. Assigning an IP Address to the VLAN Interface:
   - Navigate to IP→Interface.
   - Click "Add". From the dropdown menu, select the previously created VLAN interface (vlandev). Set the type to static.
   - Navigate to the newly created interface IP→Interface→vlandev.
   - In the "IP Addresses" field, assign the desired IP address(es) to the interface. For example: 192.168.192.168/24
4. Saving the Configuration:
   - Apply and commit the changes.

5.3. Mobile settings

Mobile network configuration is performed in the Mobile→Modem section.

The configuration revolves around the concepts of "modem" (the cellular module) and sim<n> (referring to the SIM card in the corresponding SIM slot on the router).

Depending on the number of cellular modules installed, the section will display modem1 through modem_n.

After installing SIM cards, the mobile network will attempt to connect using default settings.

To enable a modem, select the checkbox next to its name. Clicking on the row itself provides access to all available settings for that modem.

The **Status** section displays status information from the cellular operator.

Modem Configuration Fields:

Setting	Description
Disabled	Enables/disables the modem.
SIM Slots	Enables/disables individual SIM cards. Available for multi-SIM modems.
Primary SIM	Specifies which SIM card is the primary (preferred) SIM.
Return To Primary	Specifies the time interval after which the router will attempt to switch back to the primary SIM card after failing over to a secondary SIM.
Connect Timeout	The time allowed for the SIM card to connect to the cellular network. After this timeout, the router power-cycles the modem and attempts to reconnect. Measured in seconds.
Specific Bands	Selection of specific frequency bands. For example: b<x> (4G/LTE), wcdma<x> (3G/UMTS), gsm<x> (2G/GSM).
Force MCCMNC	Allows restricting the selection of cellular operators. Specifies the Mobile Country Code (MCC) and Mobile Network Code (MNC) to uniquely identify the desired network. Useful for private cellular networks.
Protocol	Selection of connection protocol: PPP or Auto.
Metric	Numerical value indicating route preference. Lower values are preferred. (Optional)
Default Route	Enables this modem as the default route.

Use Peer DNS	Enables/disables the use of DNS servers provided by the cellular operator.
MTU	Maximum Transmission Unit (MTU) value.
Status > Modem > Name	Displays the model name of the cellular module installed in the router.

The **Reset** button at the top of the section restarts the selected modem.

This quick start guide provides essential information for configuring the Ethernet interface on your industrial router. For advanced configuration options, consult the full user manual.

5.4. Using General Purpose Inputs

Router RX54x2 5G RedCap provides General Purpose Input/Output (GPIO) accessible through a 12-pin pluggable terminal block located on the front panel.

The GPIO ports can be configured to function as either inputs (GPI) or outputs (GPO). The desired configuration is selected programmatically.

Apply voltage to the GPIO pins only after the router has fully powered on. Wait for the router to complete its boot sequence (approximately two minutes).

Voltage is present on the **VOUT** pin immediately after power is applied to the router.

The voltage applied to the GPIO input must not exceed the router's supply voltage.

- **Without a 10 kΩ pull-up/pull-down resistor:** The voltage applied to the GPIO input must match the router's supply voltage. Any voltage difference is not permitted.
- **With a 10 kΩ pull-up/pull-down resistor:** A voltage difference between the router's supply voltage and the applied GPIO voltage is permissible. The resistor protects the input circuitry.

Failure to follow this instruction may damage the router and void your warranty.

GPO Operation

This table presents the electrical characteristics of the GPIO ports when the router is powered with 12V.

Table 6. GPIO Electrical Characteristics (Router Supply Voltage: 12V)

Pin (Connector)	Mode	Current (A)
GPIO	Load Mode, Total Current	0.3
GPIO1 - GPIO7	Source Mode (GPO = Vin)	0.1
GPIO1 - GPIO7	Sink Mode (GPO = GND)	0.1

When connecting devices to the router's GPIO, it is recommended to include a resistor in series with the load. The resistor value should be selected based on the specific application requirements.

To receive a signal from a connected device, configure the corresponding GPIO as an input in the router's web interface. To control a power load, configure the GPIO as an output.

An example connection diagram is shown below:

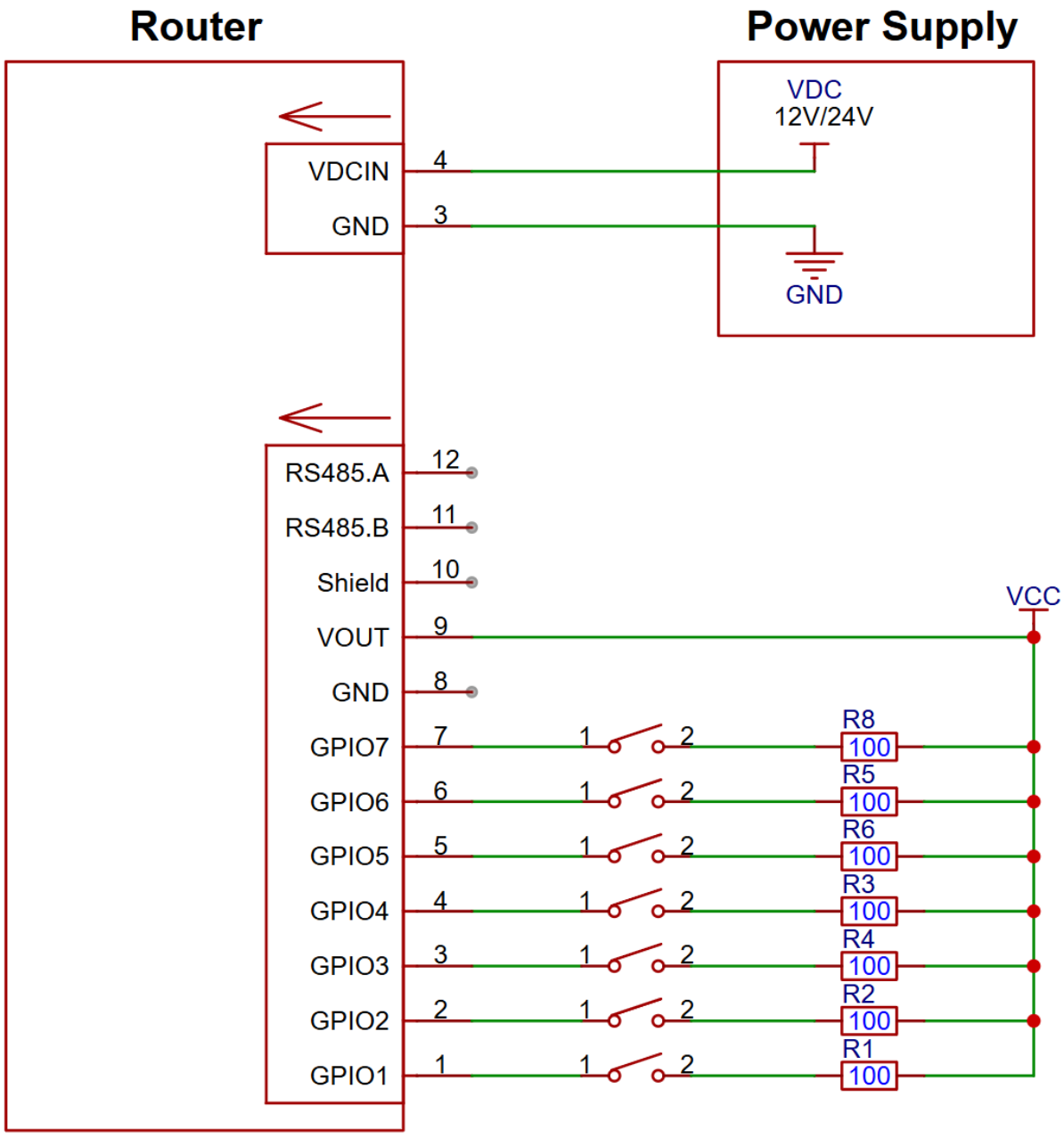


Figure 8. Connection Diagram for GPIO

For connecting electromagnetic relays, the following connection diagrams are recommended:

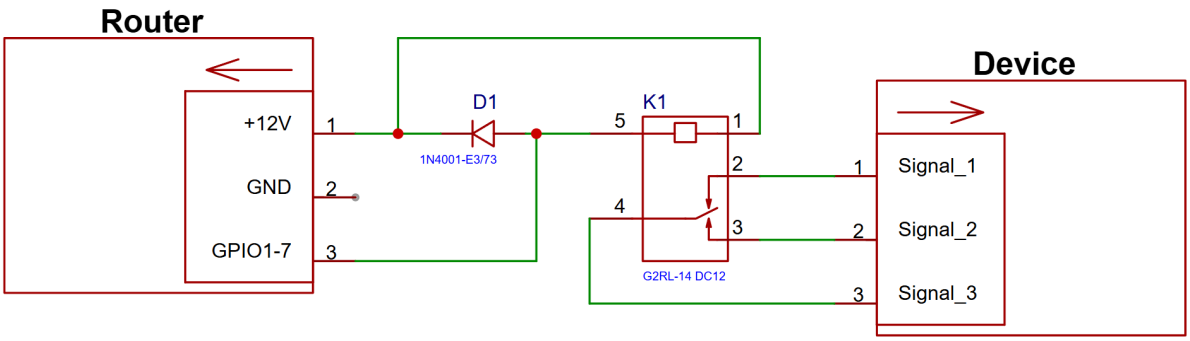


Figure 9. Connection Diagram for Electromagnetic Relays to GPIO1-GPIO7

If the relays connected to GPIO1-GPIO7 are controlled by a logic low signal (0V), the opposite terminal of these relay coils should be connected to the router's positive supply voltage (Vin).

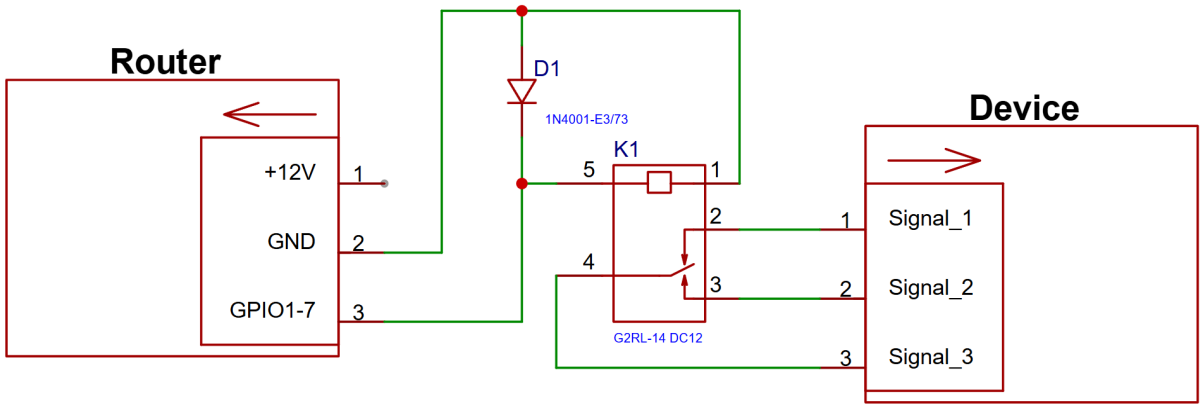


Figure 10. Connection Diagram for Electromagnetic Relays to GPIO1-GPIO7

If the relays connected to GPIO1-GPIO7 are controlled by a logic high signal (Vin), the opposite terminal of these relay coils should be connected to GND.

The use of diodes in the connection circuit is mandatory.

Relays and diodes can be substituted with suitable equivalents.

6. Customer Support

Website	donyx.com
Support center 24/7	+86 0769-21665185
E-mail	support@donyx.com