DONYX

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User's guide

Router Donyx
RM45x4 LTE CAT.4

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1. Specifications Sheet

This document applies to Router Donyx RM45x4 LTE CAT.4.

Document revision 17.02.2025.

2. General Information

This industrial-grade 4G router supports simultaneous operation of four LTE Cat4 modules, delivering download speeds of up to 150 Mbps and upload speeds of up to 50 Mbps per module. The four-module configuration provides superior redundancy, load balancing, and flexible connectivity, making it ideal for mission-critical applications.

Flexible failover scenarios are built in to maintain connection stability. The router automatically switches between LTE modules if a network failure occurs. If cellular connections are unavailable, failover to Ethernet or Wi-Fi ensures uninterrupted internet access, even in the most demanding environments.

The router supports up to four SIM cards, offering redundancy at both the module and provider levels. Features like scheduled SIM management and automatic failover protect against physical SIM card failures and optimize connectivity performance.

Key hardware features include five Gigabit Ethernet ports and dual-band Wi-Fi, providing fast and reliable network access for multiple connected devices. The router also includes discrete GPI inputs for integration with industrial systems, and a hardware-integrated GPS module delivers precise location tracking, ideal for asset tracking, fleet management, and remote monitoring.

Engineered for reliability, the router operates within a wide temperature range of -40°C to +65°C and is housed in a rugged metal enclosure designed to withstand harsh industrial conditions.

The router runs on an OpenWRT-based operating system, which supports advanced encryption protocols such as OpenVPN and IPsec, ensuring secure and reliable data transmission. Enhanced with proprietary software, the router provides advanced functionality, including custom VPN configurations, diagnostics tools, and flexible scripting capabilities tailored to industrial and enterprise applications.

This combination of robust hardware and dedicated firmware delivers exceptional performance, security, and reliability, making the router an ideal choice for critical industrial and business networks.

2.1. Cellular Standards

Table 1. Router Donyx RM45x4 LTE CAT.4 Cellular Standards

Cellular Module	Quantity	GPRS /EDGE	UMTS	HSDPA /HSUPA	HSPA+	LTE	GPS
LTE Cat 4	4	Yes	Yes	Yes	Yes	Yes	Yes

Specifications may change without prior notice!

2.2. Hardware Specifications

Number of Cellular Modules	4 x LTE Cat 4
Processor	Quad-core ARM Cortex A7 717MHz
Dynamic RAM	512 MB
NAND Flash Memory Capacity	256 MB
Wi-Fi	2.4 GHz (802.11a/b/g/n), 5 GHz (802.11ac)
Ethernet Connector	5x LAN 10/100/1000 Mbps
SIM Card Slots	Mini SIM
CONSOLE Connector	RJ45 Console Port
Microfit4 Connector	Power
Breakaway Terminal Connector	RS485, 3 x GPI
RST Button	Reset Button

2.3. Physical Specifications

- Maximum dimensions (including connectors): 180 × 180 × 50 mm
- Maximum weight: 770 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 10 to 30 V (DC)
- Current consumption, maximum:
  - At power supply voltage +12 V – 1500 mA;
  - At power supply voltage +24 V – 750 mA;

GPI 1-3 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

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

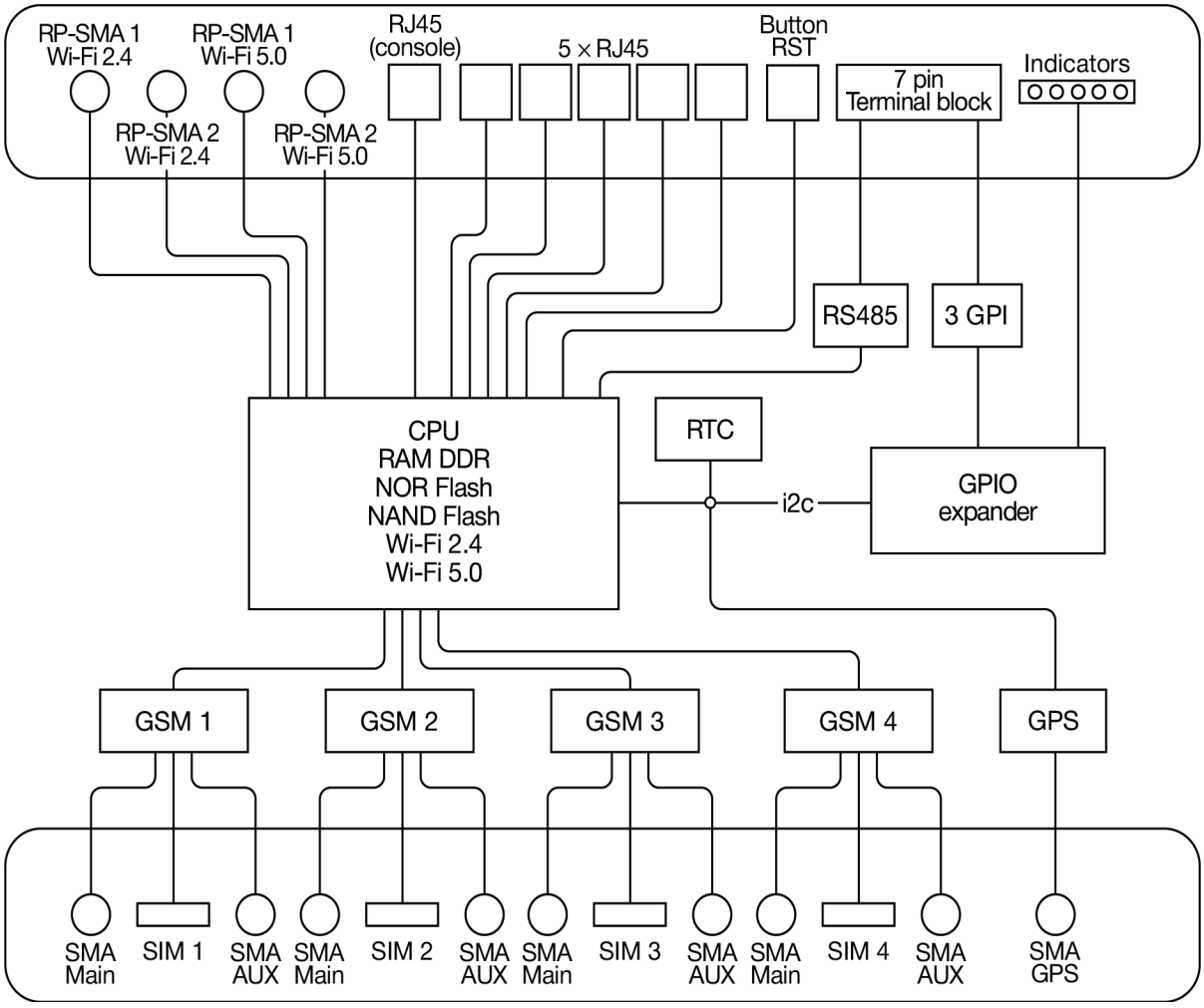
- Protect the router from dust and moisture.

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 powersupply, ports, antenna connectors and LEDs.

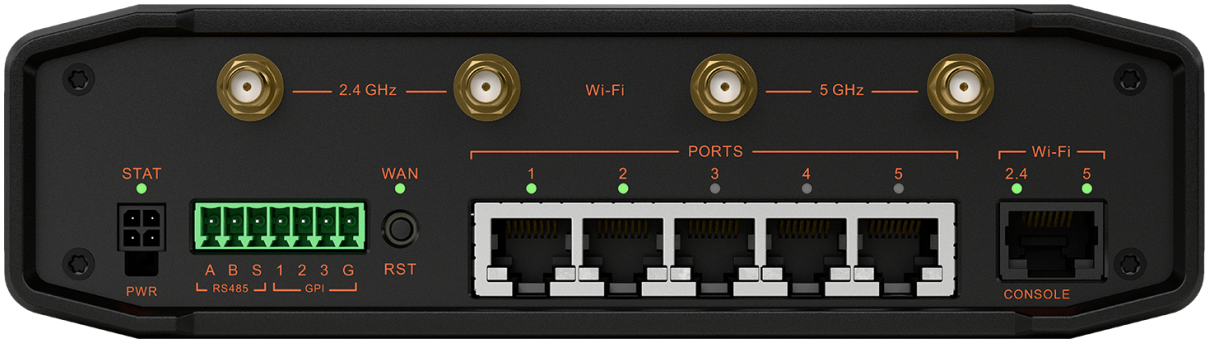


Figure 1. Front View

- **2.4 GHz** - RP-SMA Connectors for 2.4 GHz Wi-Fi Antenna
- **5 GHz** - RP-SMA Connectors for 5 GHz Wi-Fi Antenna
- **PWR** - Power Input Connector
- **RS485, GPI** - Terminal Block Connector (RS485, GPI)
- **RST** - Reset Button
- **PORTS 1-5** - Ethernet Network Ports
- **CONSOLE** - Console Interface Port

The backviews display antenna connectors, SIM slots , and LEDs.

Figure 2. Back View

- **GNSS** - GPS SMA Antenna Connector
- **A** - Mobile **AUX** Antenna Connector (Additional, Receive Only)
- **M** - Mobile **Main** Antenna Connector (Primary, Transmit and Receive)
- **SIM 1 - SIM 4** - SIM Card Trays

3.2. Power Input Connector

The Microfit4 power connector is used to connect the router to a power source. The power source requirements are: 10-30 VDC, with a minimum current of 1.5 A at 12 V.

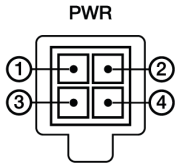


Figure 3. Power Connector

Table 2. Power Connector Pinout

Pin	Signal	Description
1	OPTO-	Not used
2	OPTO+	Not used
3	GND	Ground (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.

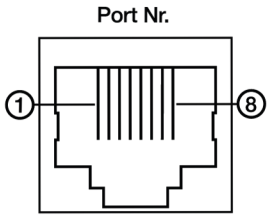


Figure 4. Ethernet Connector

Table 3. Ethernet Connector Pinout (10/100/1000 Mbps)

Pin	Signal (10BASE-T, 100BASE-T)	Signal (1000BASE-T)	Description
1	TX+	DA+	Transmit Data+ / Bi-directional
2	TX−	DA−	Transmit Data− / Bi-directional
3	RX+	DB+	Receive Data+ / Bi-directional
4	N/C	DC+	Not connected / Bi-directional
5	N/C	DC−	Not connected / Bi-directional
6	RX−	DB−	Receive Data− / Bi-directional
7	N/C	DD+	Not connected / Bi-directional
8	N/C	DD−	Not connected / Bi-directional

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.

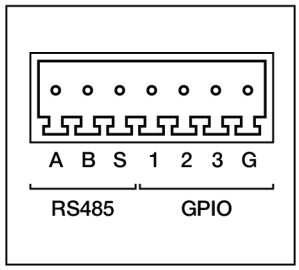


Figure 5. Interface Connector

Table 4. Interface Connector Pinout

Pin	Description
A	RS485 Signal A
B	RS485 Signal B
S	Shield (for signal cable shielding)
1	GPI1
2	GPI2
3	GPI3
G	GND (Ground/Negative; voltage level depends on the router’s power supply)

3.5. Console Interface Port

The console port is used to connect a computer to the router using a console cable.

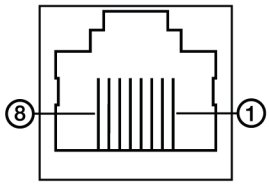


Figure 6. Console Port

Table 5. Console Port Pinout

Pin	Signal	Description
1	RTS	Request To Send (Hardware Flow Control)
2	N/C	Not connected
3	TxD	Transmit Data
4	GND	Ground
5	GND	Ground
6	RxD	Receive Data
7	N/C	Not connected
8	CTS	Clear To Send (Hardware Flow Control)

3.6. Antenna Information

The router features the following antenna connectors:

Connector Type	Image	Purpose
4 x SMA Connectors		For cellular (Main) antennas
4 x SMA Connectors		For cellular (AUX) antennas
4 x RP-SMA Connectors		For Wi-Fi antennas
GNSS Connector (SMA)		For active GPS/GLONASS antenna

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.

Cellular Module Indicators

Cellular Network Indicator	
● Solid Green	4G (LTE) connection established
❋ Blinking Green	3G connection established
● Solid Red	2G connection established
❋ 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
WAN External Network Indicator	
● Solid Green	Connection configured and established
○ Off	Connection not configured
Port 1-5 LAN Port Status Indicator	
● Solid Green	Cable connected
❋ Blinking Green	Data transmission in progress
○ Off	No cable connected

STAT Power/Status Indicator

✳ Blinking Green	Firmware update in progress
● Solid Green	Normal operation
✳ Slow Blinking Green	Booting
○ Off	No power

Wi-Fi Indicators

2.4 Wi-Fi 2.4 GHz Wi-Fi Indicator

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

5 Wi-Fi 5 GHz 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

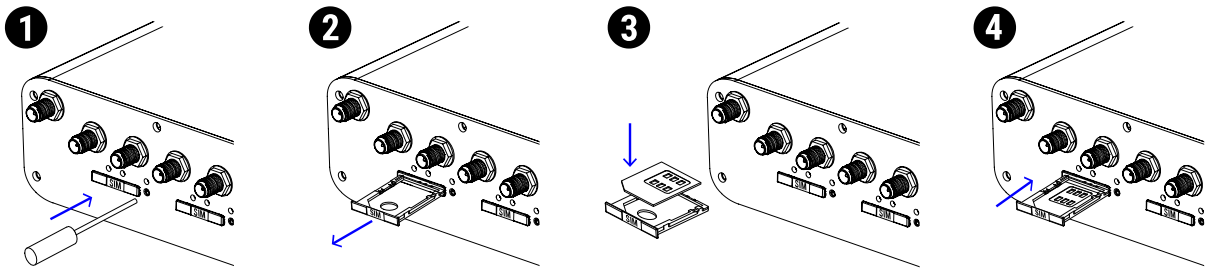


Figure 7. SIM Card Placement

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 RM45x4 LTE CAT.4 provides General Purpose Inputs (GPIs) accessible through a 7-pin pluggable terminal block located on the front panel.

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

The voltage applied to any GPI must not exceed the router's supply voltage.

Without a 10 kΩ pull-up resistor: The voltage applied to the GPI must be equal to the router's supply voltage. Any voltage difference is not permitted.

With a 10 kΩ pull-up resistor: A voltage difference between the router's supply voltage and the applied GPI voltage is permissible.

When connecting devices to the router's GPIs, a series resistor is required in the circuit. The resistor value should be determined based on the specific application requirements.

The following diagram illustrates an example connection:

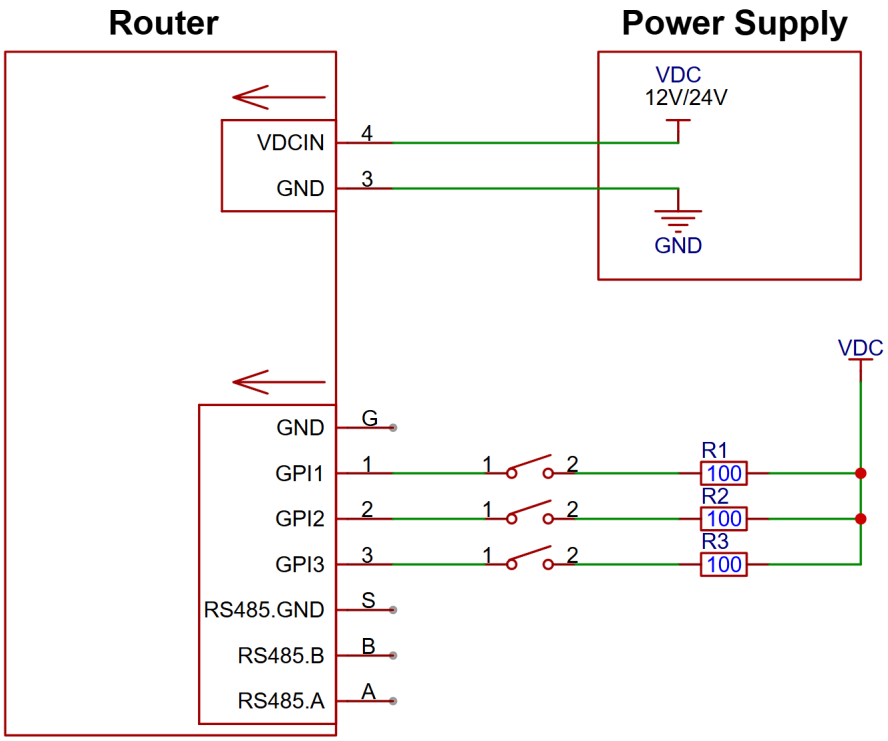


Figure 8. Example GPI Connection Diagram

The use of series resistors in the GPI circuit is mandatory. Select appropriate resistor values for your specific application.

6. Customer Support

Website	donyx.com
Support center 24/7	+86 0769-21665185
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