

# Broadband Relay Switch Matrix

Specification and Manual

## BRSM-16



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## Description and features

BRSM-16 Switch Matrix is a switching device operated in a wide frequency band from DC to 18 GHz. Device has one input and 16 outputs (SP16T configuration). The model has high reliability (10 million switch cycles) and provides excellent accuracy when working with the device, by having low insertion loss (0.25 dB typ.) and very high isolation value (95 dB typ.).

The device is controlled in two ways: manually by

using the buttons on the BRSM-16 front panel or by SCPI commands when the BRSM-16 connected to a PC via USB or Ethernet interfaces.

The BRSM-16 switch comes with all the necessary accessories and software and is perfectly suited for use in automated test equipment, controlling radio frequency signal path, research and development.

## Structure diagram

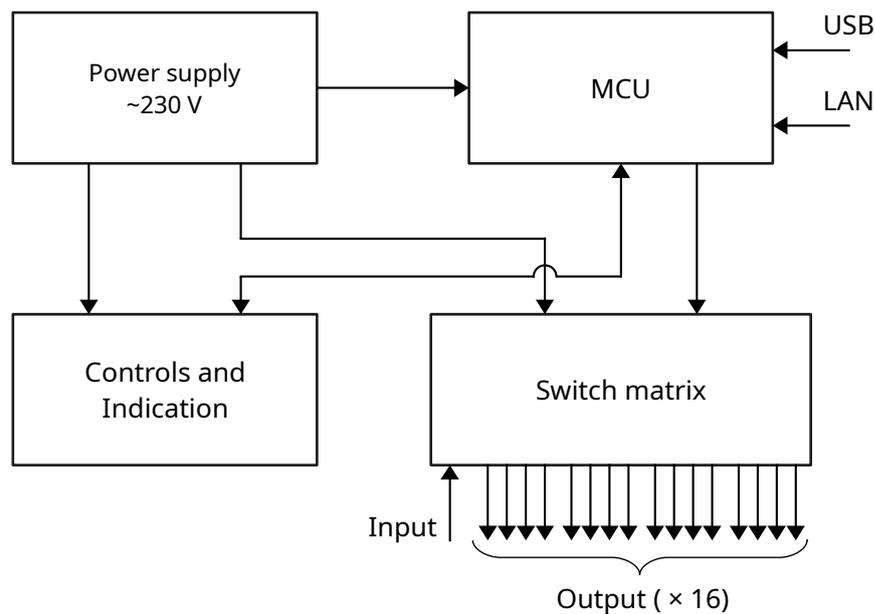


Figure1. BRSM-16 structure diagram.

## Specifications

| Parameter                   | Conditions           | Min             | Typ.            | Max  | Units  |
|-----------------------------|----------------------|-----------------|-----------------|------|--------|
| Frequency range             |                      | DC              | -               | 18   | GHz    |
| Insertion loss              | DC to 1 GHz          | -               | 0.10            | 0.20 | dB     |
|                             | 1 GHz to 8 GHz       | -               | 0.15            | 0.30 |        |
|                             | 8 GHz to 12 GHz      | -               | 0.25            | 0.40 |        |
|                             | 12 GHz to 18 GHz     | -               | 0.50            | 0.80 |        |
| Isolation                   | DC to 1 GHz          | 85              | 105             | -    | dB     |
|                             | 1 GHz to 8 GHz       | 80              | 100             | -    |        |
|                             | 8 GHz to 12 GHz      | 75              | 95              | -    |        |
|                             | 12 GHz to 18 GHz     | 60              | 80              | -    |        |
| VSWR                        | DC to 1 GHz          | -               | 1.05            | 1.10 |        |
|                             | 1 GHz to 8 GHz       | -               | 1.20            | 1.40 |        |
|                             | 8 GHz to 12 GHz      | -               | 1.20            | 1.40 |        |
|                             | 12 GHz to 18 GHz     | -               | 1.30            | 1.60 |        |
| Switching lifetime          | 0.1 W                | 10 <sup>7</sup> | -               | -    | cycles |
|                             | hot switching, 1.0 W | -               | 10 <sup>6</sup> | -    |        |
| RF power                    | cold switching       | -               | -               | 20   | W      |
| Switching time              |                      | -               | 20              | -    | ms     |
| Power consumption           |                      | -               | -               | 20   | W      |
| Power supply voltage        |                      | 88              | -               | 264  | VAC    |
| Power supply frequency      |                      | 47              | -               | 63   | Hz     |
| Operating temperature range |                      | -15             | -               | 45   | °C     |
| Storage temperature range   |                      | -15             | -               | TBD  | °C     |
| Size (H × W × D)            |                      | 158 × 327 × 298 |                 |      | mm     |
|                             | with mountings       | 158 × 339 × 298 |                 |      |        |
| Weight                      |                      | -               | 3.0             | -    | kg     |

**Note.** Typical values refer to the following conditions: ambient temperature is 25°C.

## Front and rear panels

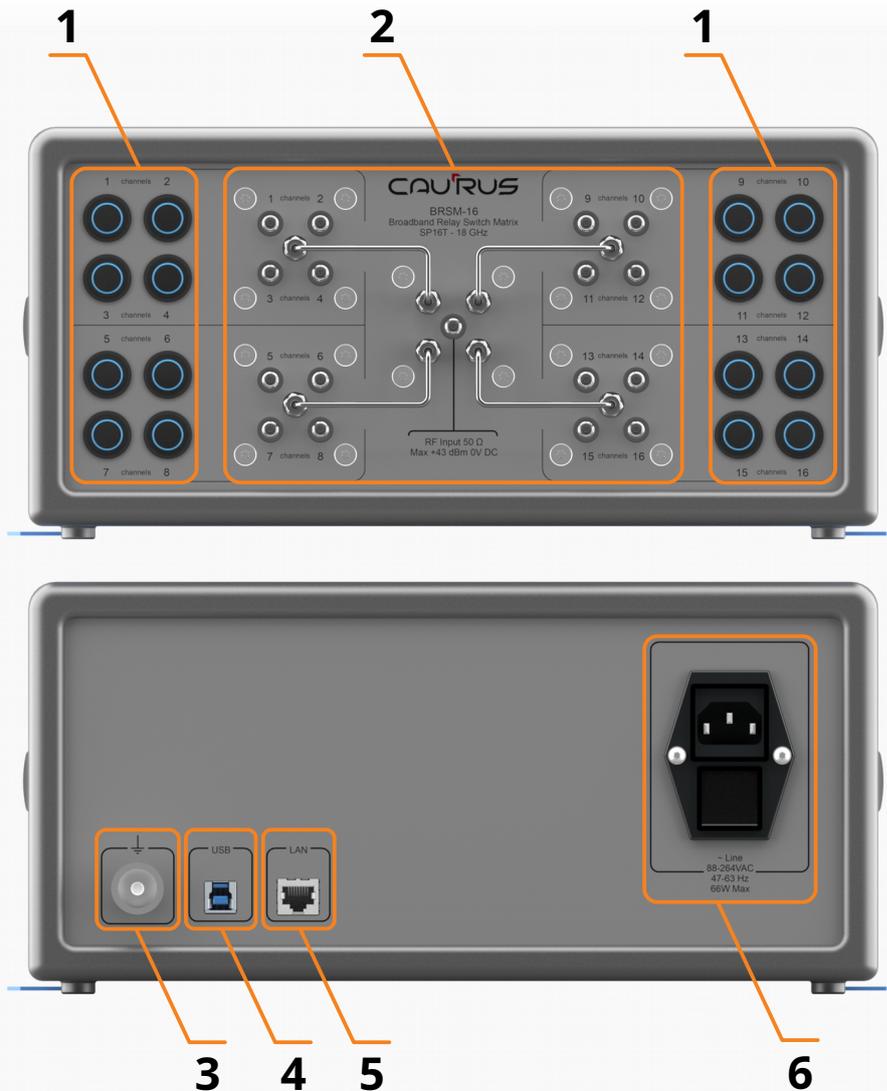


Figure 2. BRSM-16 front (top) and rear (bottom) panels.

- |   |   |
|---|---|
| 1 | 16 channel's control buttons with led indication of the active channel for manual mode  |
| 2 | Switch matrix: 1 input (SMA Female, max +43 dBm, 50 $\Omega$ ), 16 outputs (SMA Female) |
| 3 | Ground connection   |
| 4 | USB 2.0 type B connector  |
| 5 | Ethernet 100BASE-T 8P8C connector   |
| 6 | Power supply connector ~230 V with inbuilt switch and fuse                              |

## Operation with BRSM-16

### Powering on the device

To power on the BRSM-16 first of all connect the power with voltage of 230 VAC by included power cord and then turn on the power switch on the rear panel. After powering on, led indication test will be performed and audio signal will be given, and channel № 1 will become active.



*When you work with high voltages and, in particular, with this device, follow to safety standards and rules and always use three-core power cord to connect the device to the grounded socket to avoid electric shock and severe injuries.*

### Device's operating modes

There are three operating modes of the BRSM-16:

|                        | <i>Manual mode</i>   | <i>USB mode</i>   | <i>Ethernet mode</i>  |
|------------------------|--|---|---|
| <i>Mode activation</i> | The manual mode is active when there is no USB or Ethernet logical connections.                                  | Device connection to PC by included USB cable is required. When you set the USB connection between BRSM-16 and PC, virtual COM port will appear in an operating system. The USB mode will activate when connecting to this port through the high-level program. USB mode is unavailable in Ethernet mode. | Device connection to PC by included Ethernet cable is required. When you set the Ethernet connection between BRSM-16 and PC, the device gets dynamic IP address by the Dynamic Host Configuration Protocol (DHCP), after that BRSM-16 available as TCP server with 12345 port. The Ethernet mode will activate when connecting to this server through the high-level program. |
| <i>Control</i>         | Channel switching is performed by pressing the corresponding buttons on the front panel of the device.           | Channel switching is performed by sending the corresponding SCPI command to COM port.   | Channel switching is performed by sending the corresponding SCPI command to TCP server.   |
| <i>Indication</i>      | The active channel has a continuous led indication of the corresponding button on the front panel of the device. | Channel switching is accompanied by the audio signal.   |   |
|                        |  | The active channel has an intermittent led indication of the corresponding button on the front panel of the device.   |   |

### SCPI commands

The following set of SCPI commands is supported to control the BRSM-16 switch in USB and Ethernet modes:

- Setting up the active channel:
 

**channel : N (ch : N for short),**

where N is a channel number from 1 to 16;
- Request for the current active channel:
 

**channel ? (ch ? for short).**

### Software for BRSM-16 switch control

User can use any of terminal applications in the Microsoft Windows 10 (64 bit) operating system environment to control the BRSM-16 switch through sending the SCPI commands to COM port or TCP server. However we recommend to use *Caurus BRSM-16* software, which can be downloaded from CAURUS website:

<http://caurus.sa.com/documents/2018/06/caurus-brsm-16-software.zip>

At first step it is necessary to unpack the downloaded archive into the directory assigned by user on a PC. After unpacking, you need to start the application file *DC\_SWITCH\_BRSM\_16\_V1.exe*, whose appearances are shown in figure 3 for the case when the BRSM-16 switch is connected to the PC (there is no logical connection in figure 3a; logical connection via USB is established in figure 3b).

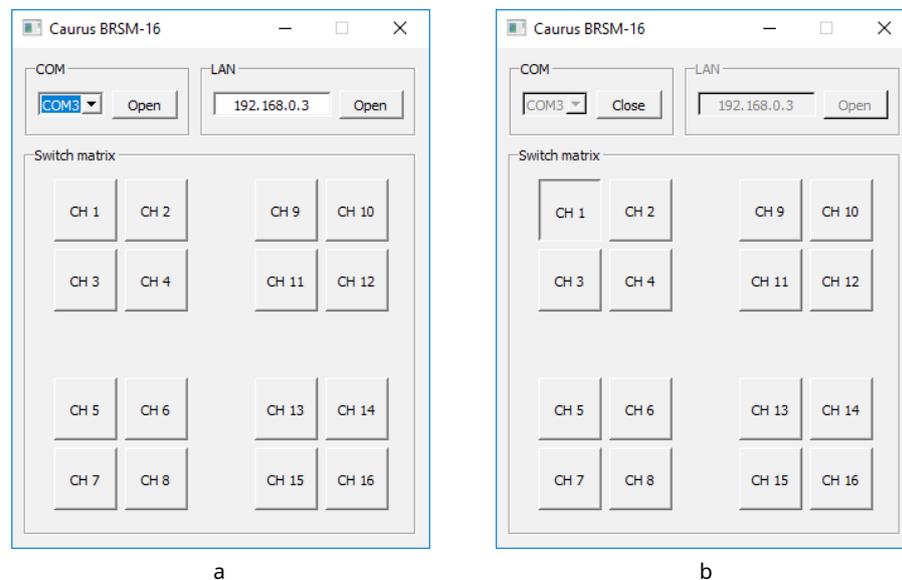


Figure 3. Caurus BRSM-16 software.

The *Caurus BRSM-16* software allows to connect to the BRSM-16 switch in both USB mode and in Ethernet mode:

- to connect in USB mode, select the COM port in the drop-down list of the **COM** box, corresponding to the BRSM-16 switch connected to the PC, and then click the **Open** button in the **COM** box (see figure 3a). To exit USB mode, click the **Close** button in the **COM** box (see figure 3b).
- to connect in Ethernet mode, enter the IP address in the text field of the **LAN** box, corresponding to the BRSM-16 switch connected to the PC, and then click the **Open** button in the **LAN** box (see figure 3a). To exit Ethernet mode, click the **Close** button in the **LAN** box.

When you connect in any of the modes, current active channel will be displayed in the **Switch matrix** box as pushed button (see CH 1 button in figure 3b). Then the channel is switched by clicking the appropriate buttons in the **Switch matrix** box.

## Outline drawing

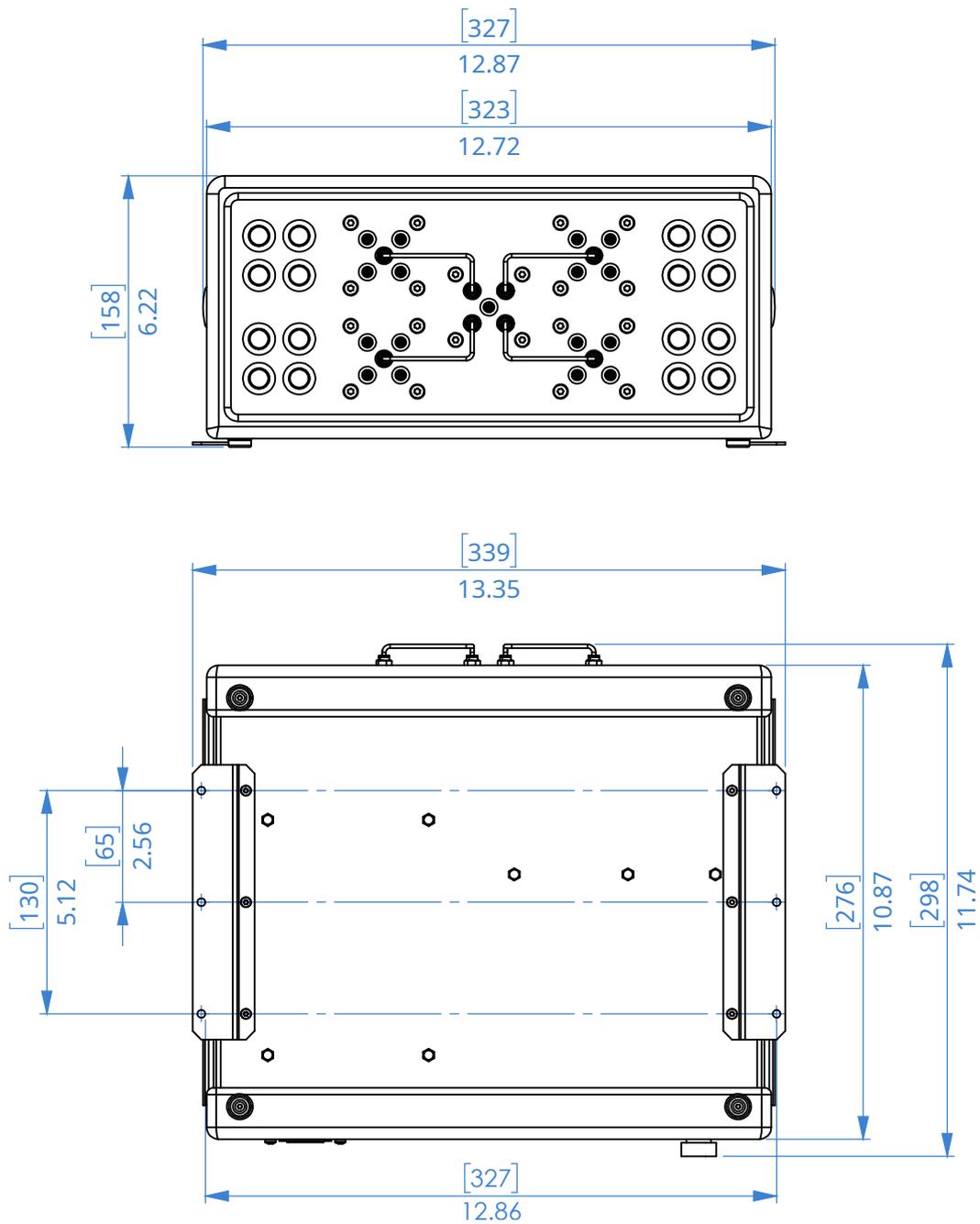


Figure 4. BRSM-16 drawing and dimensions;  
all dimensions in inches [millimeters].

## Ordering Information

| Item    | Description   |
|---------|---|
| BRSM-16 | Broadband Relay Switch Matrix, frequency range up to 18 GHz<br>Accessories included: <ol style="list-style-type: none"><li>1. AC power cord (1.5 m, 230 V)</li><li>2. USB 2.0 cable (1 m, USB type A to USB type B)</li><li>3. Ethernet cable (1 m, 8P8C)</li><li>4. Printed Documentation</li></ol> Warranty for BRSM-16: <i>TBD</i> . |

*Note.* The contents of the delivery set can be changed at any time without prior notice.

## Revision History

07/2018 Rev. 0 – Initial Version

## Notice

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