# Technical Information

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# Switch Unit ZS129A5

## Signal distribution

The Rohde & Schwarz Switch Unit ZS129A5 is part of a new generation of signal distribution equipment. Its flexible concept allows adaptation to system requirements by adding optional extensions.

- Cost-effective realization of customer-specific solutions due to modular design and wide variety of modules
- Compact design: 19” rackmount unit with a height of just 2 units for easy integration into system racks
- Suitable for stationary, transportable and mobile applications
- Up to 18 RF connectors for complex signal distribution
- Full remote control via parallel control inputs and optional serial I²C bus interface from two independent working positions
- Additional outputs for controlling additional RF, IF or AF matrices via the same control interface

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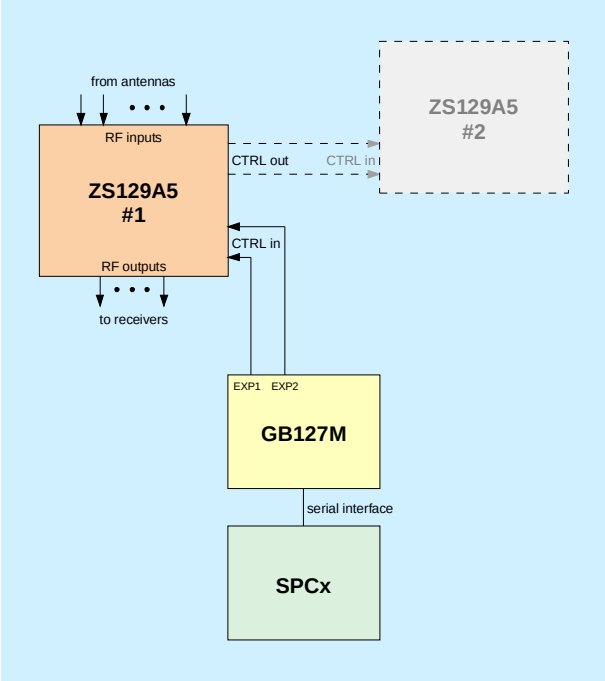
## Introduction

Monitoring systems usually comprise several receiving antennas that have to be dynamically switched to the receivers in order to achieve the optimum system configuration for the individual tasks.

The Rohde & Schwarz Switch Unit ZS129A5 is an intelligent and flexible solution for stationary, transportable and mobile applications in connection with the Antenna Control Units GB127S or GB127M.




Circuit diagram for controlling one or optionally two ZS129A5 units from a GB127M

## Overview

The Switch Unit ZS129A5 is ideal for a wide variety of indoor RF and IF switching applications. Thanks to its modular concept, the hardware of the switch unit is very easy to configure.

Various RF switches, multicouplers, filters and a DC feed are available to create a unit that meets the specific requirements of most monitoring systems. The modules are selected by Rohde & Schwarz according to the specifications of the particular monitoring system.

The ZS129A5 has been designed as an indoor unit. Since manual operation is not required, it can be located at a remote position, e.g. somewhere inside a rack so that no space is wasted at the front.

Usually the ZS129A5 is controlled remotely from the Antenna Control Units GB127S or GB127M, which are operated either manually at their front panels or remotely from a system process controller.

## Basic unit

The basic unit consists of a rugged 19" rackmount with an integrated connection board and connectors for control inputs, control outputs and optional external power supply. Inside, there is a lot of space to integrate optional modules.

The backplane can be equipped with up to 18 RF connectors, used as inputs or outputs, depending on the individual configuration.

## Switches

The following RF switch modules have been designed as standard for the ZS129A5:

- ZS129S1
  RF switch, 1-out-of-2
- ZS129S2
  RF switch, 1-out-of-6
- ZS129S3
  RF switch, 1-out-of-8
- ZS129S4
  RF switch, 1-out-of-2,
  unused inputs terminated into 50 Ω
- ZS129S5
  transfer switch with 2 inputs and 2 outputs
- ZS129S6
  RF switch, 1-out-of-8,
  unused inputs terminated into 50 Ω

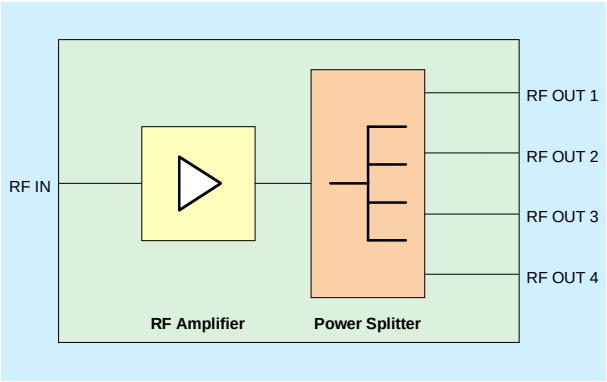
Different switch matrices can be created for specific requirements by combining the switch modules within the ZS129A5.

For special applications, further switch modules are available on request.

## Multicouplers

When it comes to distributing antenna signals to more than one receiver at the same time, a multicoupler is most often the best choice. A multicoupler consists of an RF amplifier followed by a power splitter. The amplifier compensates for the insertion loss of the power splitter, so that the overall gain is about 0 to +3 dB.

Thanks to the high output isolation, in most cases, expensive terminated RF switches can be avoided and standard switch modules may be used.




Upon request, Rohde & Schwarz provides different multicouplers as separate 19" rackmounts for the following frequency ranges:

- (10 kHz) 100 kHz to 80 MHz
  4 or 8 outputs,
  suitable, for example, for the Antennas HE010, HE011, HUF-Z2
- 20 MHz to 1300 MHz
  4 or 8 outputs
  suitable, for example, for the Antennas HE309, HE314A1, HF214, HK014, HK309, HL023A1 / A2
- 1000 MHz to 3000 MHz
  4 or 8 outputs
  suitable, for example, for the Antenna HF902

The ZS129M1 module, which can be integrated into the basic unit, is a cost-efficient solution for taking a signal to two outputs. Since this module is a resistive power splitter with low output decoupling, it can be combined only with terminated relays.

## DC feed

The ZS129F1 option is used to apply a DC voltage to the inner conductor of the antenna input. This is an ideal solution for the power supply of most active receiving antennas.

The DC feed can supply a DC voltage of up to 30 V, at a maximum current of 500 mA.

## I²C control

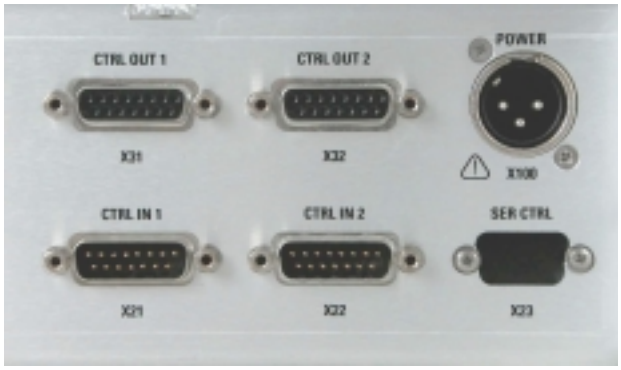
If the option ZS129C1 is included, the Switch Unit ZS129A5 can be remotely controlled via a serial I²C bus interface. In this case, the parallel control inputs CTRL IN 1 and CTRL IN 2 are disconnected internally. The two parallel control outputs CTRL OUT 1 and CTRL OUT 2 are still available to control additional switch units.

The standard I²C bus control cable supplied by Rohde & Schwarz, which is connected between the control unit (e.g. GB127x) and the ZS129A5, has been tested for lengths of up to 120 m.

The SER CTRL connector is part of this option.

## Operation

Normally, the Switch Unit ZS129A5 is operated remotely via one or two parallel control inputs (CTRL IN 1 and CTRL IN 2). Each of the two interfaces comprises pins for the +28 V DC supply voltage and eight independent control lines.




The RF relays of the switch modules are directly driven from the +28 V DC supply and controlled by GND signals applied to the control lines. These signals are compatible with the GB127x's auxiliary control outputs EXP1 and EXP2. Therefore, the ZS129A5 can be directly connected to the Antenna Control Unit GB127x.

In this case, the ZS129A5 may be operated either manually from the GB127x's front panel or remotely from the system controller which is connected to the serial interfaces of the GB127x.

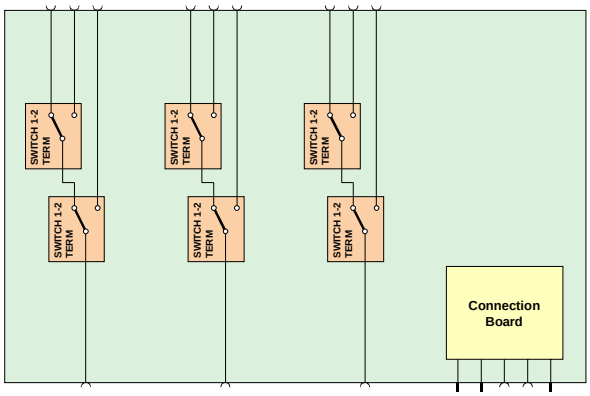
The standard control cables between the control unit and the ZS129A5 have been tested for lengths of up to 10 m.

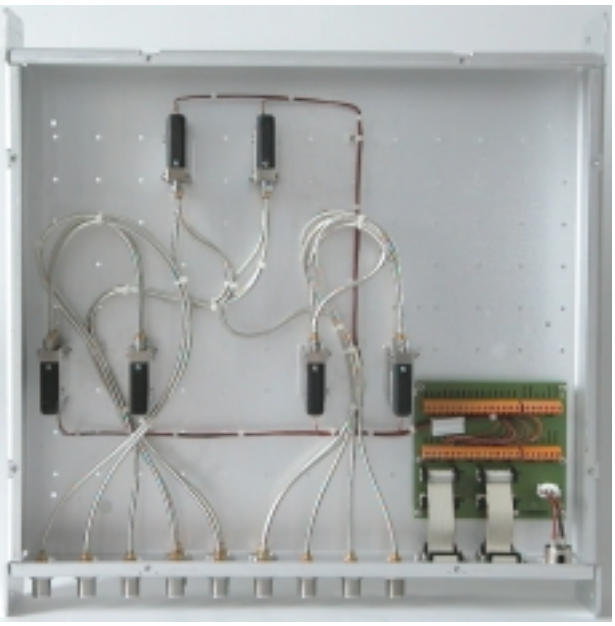
Two parallel control outputs (CTRL OUT 1 and CTRL OUT 2) are provided in order to connect additional units, e.g. to cascade two or more ZS129A5 units.

The POWER connector may be used to feed an external supply voltage for active modules, e.g. when an amplifier or multicoupler is integrated in the ZS129A5.

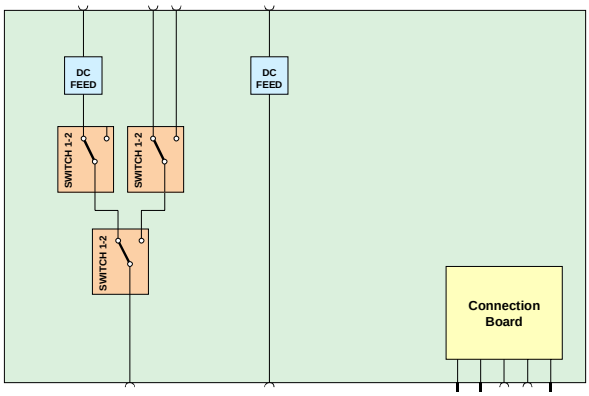
## Applications

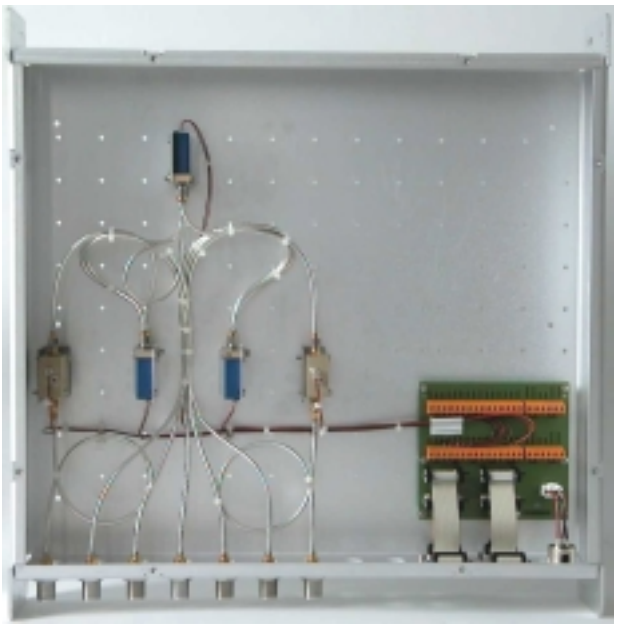
**Example 1:** Three independent RF switches, 1-out-of-3, unused inputs terminated, each implemented by means of two ZS129S4s



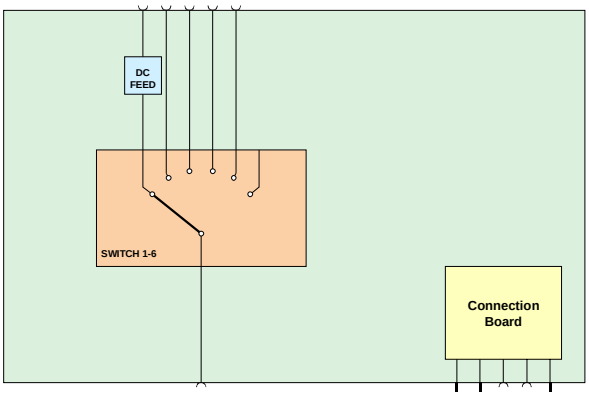



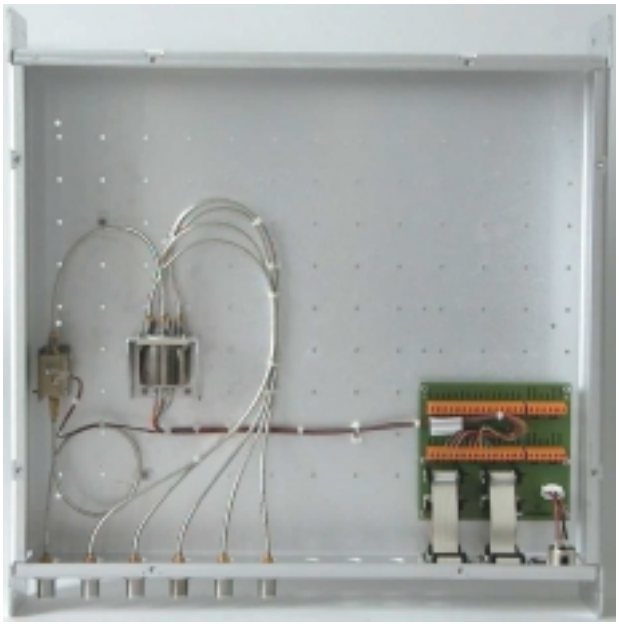
**Example 2:** RF switch, 1-out-of-4, implemented by three ZS129S1s and two ZS129F1s



**Example 3:** RF switch, 1-out-of-5, implemented by one ZS129S2 and one ZS129F1



# Specifications

## ZS129A5

| | |
|---|---|
| **RF data** | |
| Frequency range | DC to 3 GHz |
| Input VSWR | depending on hardware configuration |
| Insertion loss (in/out) | depending on hardware configuration |
| Impedance | 50 Ω |
| **Interfaces** | |
| SIGNAL 1 to 18 | N jacks (X1 to X18)<br>RF inputs / outputs, depending on hardware configuration<br>(unused connectors are not installed) |
| CTRL IN 1 and 2 | D-SUB plugs, 15 pins (X21 and X22) |
| CTRL OUT 1 and 2 | D-SUB jacks, 15 pins (X31 and X32) |
| POWER | round connector, 3 pins (X100) |
| SER CTRL | D-SUB plug, 9 pins (X23)<br>(installed only if option $I^2C$ CONTROL is selected) |
| **General data** | |
| Limit temperature range | -35 ºC to +55 ºC |
| Storage temperature range | -40 ºC to +70 ºC |
| Humidity | 95% relative humidity at +55 ºC |
| Sinusoidal vibration | 5 Hz to 150 Hz |
| Random vibration | 10 Hz to 300 Hz |
| Shock | 40 g shock spectrum |
| EMC | meets EMC directive of EU (89/336/EEC)<br>and German EMC law |
| Quality standard | developed and manufactured in compliance with ISO 9000 |
| Power supply | +28 V DC<br>(via control input or from external power supply) |
| Dimensions (W x H x D) | 19" rackmount without front panel<br>2 HU – 450 mm x 85 mm x 460 mm |
| Weight | 3.6 kg |

## ZS129S1

**Function**
RF switch 1-out-of-2

**RF data**

| | |
|---|---|
| Frequency range | DC to 3 GHz |
| Input VSWR | ≤1.4 (DC to 3 GHz) |
| Insertion loss (in/out) | ≤1 dB (DC to 3 GHz) |
| Impedance | 50 Ω |
| RF power | ≤70 W (cold switching, DC to 3 GHz) |
| Switching time | ≤10 ms |
| Life | 5 000 000 operations |

**Interfaces**

| | |
|---|---|
| RF inputs | 8 inputs - SMA jacks |
| RF output | SMA jack |
| CONTROL | wires<br>black = GND<br>red = +28 V DC / 60 mA |

**General data**

| | |
|---|---|
| Limit temperature range | -40 ºC to +70 ºC |
| Storage temperature range | -55 ºC to +85 ºC |
| Humidity | 95% relative humidity at +55 ºC |
| Sinusoidal vibration | 5 Hz to 150 Hz |
| Random vibration | 10 Hz to 300 Hz |
| Shock | 40 g shock spectrum |
| Quality standard | developed and manufactured in compliance with ISO 9000 |
| Power supply | +28 V DC |
| Dimensions (W x H x D) | 25 mm x 52 mm x 50 mm |
| Weight | 0.1 kg |

## ZS129S2

**Function**
RF switch 1-out-of-6

**RF data**

| | |
|---|---|
| Frequency range | DC to 3 GHz |
| Input VSWR | ≤1.4 (DC to 3 GHz) |
| Insertion loss (in/out) | ≤1 dB (DC to 3 GHz) |
| Impedance | 50 Ω |
| RF power | ≤50 W (cold switching, DC to 3 GHz) |
| Switching time | ≤15 ms |
| Life | 1 000 000 operations |

**Interfaces**

| | |
|---|---|
| RF inputs | SMA jacks |
| RF output | SMA jack |
| CONTROL | wires |

| | |
|---|---|
| red = | +28 V DC / 150 mA |
| brown = | CTRL 1 (switched GND) |
| orange = | CTRL 2 (switched GND) |
| yellow = | CTRL 3 (switched GND) |
| green = | CTRL 4 (switched GND) |
| blue = | CTRL 5 (switched GND) |
| violet = | CTRL 6 (switched GND) |

**General data**

| | |
|---|---|
| Limit temperature range | -40 ºC to +70 ºC |
| Storage temperature range | -55 ºC to +85 ºC |
| Humidity | 95% relative humidity at +55 ºC |
| Sinusoidal vibration | 5 Hz to 150 Hz |
| Random vibration | 10 Hz to 300 Hz |
| Shock | 40 g shock spectrum |
| Quality standard | developed and manufactured in compliance with ISO 9000 |
| Power supply | +28 V DC |
| Dimensions (W x H x D) | 56 mm x 52 mm x 60 mm |
| Weight | 0.2 kg |

## ZS129S3

**Function**
RF switch 1-out-of-8

**RF data**

| | |
|---|---|
| Frequency range | DC to 3 GHz |
| Input VSWR | ≤1.4 (DC to 3 GHz) |
| Insertion loss (in/out) | ≤1 dB (DC to 3 GHz) |
| Impedance | 50 Ω |
| RF power | ≤50 W (cold switching, DC to 3 GHz) |
| Switching time | ≤15 ms |
| Life | 2 000 000 operations |

**Interfaces**

| | |
|---|---|
| RF inputs | SMA jacks |
| RF output | SMA jack |
| CONTROL | wires |

| | |
|---|---|
| red = | +28 V DC / 150 mA |
| brown = | CTRL 1 (switched GND) |
| orange = | CTRL 2 (switched GND) |
| yellow = | CTRL 3 (switched GND) |
| green = | CTRL 4 (switched GND) |
| blue = | CTRL 5 (switched GND) |
| violet = | CTRL 6 (switched GND) |
| grey = | CTRL 7 (switched GND) |
| white = | CTRL 8 (switched GND) |

**General data**

| | |
|---|---|
| Limit temperature range | -40 ºC to +70 ºC |
| Storage temperature range | -55 ºC to +85 ºC |
| Humidity | 95% relative humidity at +55 ºC |
| Sinusoidal vibration | 5 Hz to 150 Hz |
| Random vibration | 10 Hz to 300 Hz |
| Shock | 40 g shock spectrum |
| Quality standard | developed and manufactured in compliance with ISO 9000 |
| Power supply | +28 V DC |
| Dimensions (W x H x D) | 80 mm x 69 mm x 65 mm |
| Weight | 0.3 kg |

## ZS129S4

**Function**
RF switch 1-out-of-2,
unused inputs terminated into 50 Ω

**RF data**

| | |
|---|---|
| Frequency range | DC to 3 GHz |
| Input VSWR | ≤1.4 (DC to 3 GHz) |
| Insertion loss (in/out) | ≤1 dB (DC to 3 GHz) |
| Impedance | 50 Ω |
| RF power | ≤0.5 W (due to termination resistors) |
| Switching time | ≤15 ms |
| Life | 2 000 000 operations |

**Interfaces**

| | |
|---|---|
| RF inputs | SMA jacks |
| RF output | SMA jack |
| CONTROL | wires<br>black = GND<br>red = +28 V DC / 205 mA |

**General data**

| | |
|---|---|
| Limit temperature range | -40 ºC to +85 ºC |
| Storage temperature range | -55 ºC to +85 ºC |
| Humidity | 95% relative humidity at +55 ºC |
| Sinusoidal vibration | 5 Hz to 150 Hz |
| Random vibration | 10 Hz to 300 Hz |
| Shock | 40 g shock spectrum |
| Quality standard | developed and manufactured in compliance with ISO 9000 |
| Power supply | +28 V DC |
| Dimensions (W x H x D) | 25 mm x 60 mm x 70 mm |
| Weight | 0.2 kg |

## ZS129S5

**Function**
RF transfer switch 2-out-of-2

**RF data**

| | |
|---|---|
| Frequency range | DC to 3 GHz |
| Input VSWR | ≤1.4 (DC to 3 GHz) |
| Insertion loss (in/out) | ≤1 dB (DC to 3 GHz) |
| Impedance | 50 Ω |
| RF power | ≤50 W (cold switching, DC to 3 GHz) |
| Switching time | ≤15 ms |
| Life | 2 000 000 operations |

**Interfaces**

| | |
|---|---|
| RF inputs | SMA jacks |
| RF outputs | SMA jacks |
| CONTROL | wires<br>black = GND<br>red = +28 V DC / 140 mA |

**General data**

| | |
|---|---|
| Limit temperature range | -55 ºC to +85 ºC |
| Storage temperature range | -55 ºC to +85 ºC |
| Humidity | 95% relative humidity at +55 ºC |
| Sinusoidal vibration | 5 Hz to 150 Hz |
| Random vibration | 10 Hz to 300 Hz |
| Shock | 40 g shock spectrum |
| Quality standard | developed and manufactured in compliance with ISO 9000 |
| Power supply | +28 V DC |
| Dimensions (W x H x D) | 56 mm x 52 mm x 60 mm |
| Weight | 0.2 kg |

## ZS129S6

**Function**
RF switch 1-out-of-8,
unused inputs terminated into 50 Ω

**RF data**

| | |
|---|---|
| Frequency range | DC to 3 GHz |
| Input VSWR | ≤1.4 (DC to 3 GHz) |
| Insertion loss (in/out) | ≤1 dB (DC to 3 GHz) |
| Impedance | 50 Ω |
| RF power | ≤1.0 W per input<br>≤3.0 W total<br>(due to termination resistors) |
| Switching time | ≤15 ms |
| Life | 2 000 000 operations |

**Interfaces**

| | |
|---|---|
| RF inputs | 8 SMA jacks |
| RF output | 1 SMA jack |
| CONTROL | wires |

| | |
|---|---|
| red = | +28 V DC / 150 mA |
| brown = | CTRL 1 (switched GND) |
| orange = | CTRL 2 (switched GND) |
| yellow = | CTRL 3 (switched GND) |
| green = | CTRL 4 (switched GND) |
| blue = | CTRL 5 (switched GND) |
| violet = | CTRL 6 (switched GND) |
| grey = | CTRL 7 (switched GND) |
| white = | CTRL 8 (switched GND) |

**General data**

| | |
|---|---|
| Limit temperature range | -40 ºC to +70 ºC |
| Storage temperature range | -55 ºC to +85 ºC |
| Humidity | 95% relative humidity at +55 ºC |
| Sinusoidal vibration | 5 Hz to 150 Hz |
| Random vibration | 10 Hz to 300 Hz |
| Shock | 40 g shock spectrum |
| Quality standard | developed and manufactured in compliance with ISO 9000 |
| Power supply | +28 V DC |
| Dimensions (W x H x D) | 80 mm x 69 mm x 65 mm |
| Weight | 0.3 kg |

## ZS129F1

**Function**
DC Feed

**RF data**

| | |
|---|---|
| Frequency range | 100 kHz to 3 GHz |
| Input VSWR | ≤1.4 (100 kHz to 3 GHz) |
| Insertion loss (in/out) | ≤2 dB (100 kHz to 3 GHz) |
| Impedance | 50 Ω |
| RF power | ≤1 W |

**Interfaces**

| | |
|---|---|
| RF | SMA jack |
| RF & DC | SMA plug |
| POWER | wires<br>black = GND<br>red = +28 V DC / 140 mA |

**General data**

| | |
|---|---|
| Limit temperature range | -40 ºC to +70 ºC |
| Storage temperature range | -55 ºC to +85 ºC |
| Humidity | 95% relative humidity at +55 ºC |
| Sinusoidal vibration | 5 Hz to 150 Hz |
| Random vibration | 10 Hz to 300 Hz |
| Shock | 40 g shock spectrum |
| Quality standard | developed and manufactured in compliance with ISO 9000 |
| Power supply | +28 V DC |
| Dimensions (W x H x D) | 28 mm x 65 mm x 55 mm |
| Weight | 0.1 kg |

## ZS129M1

**Function**
RF power splitter 1-2, resistive

**RF data**

| | |
|---|---|
| Frequency range | DC to 4 GHz |
| Attenuation (in/out) | typ. 6.5 dB |
| Attenuation (out/out) | > 6 dB |
| Impedance | 50 Ω |
| Max. input power | ≤+27 dBm (no damage) |

**Interfaces**

| | |
|---|---|
| RF IN | SMA plug |
| RF OUT 1 to 2 | SMA plugs |

**General data**

| | |
|---|---|
| Limit temperature range | -20 ºC to +65 ºC |
| Storage temperature range | -55 ºC to +100 ºC |
| Humidity | 95% relative humidity at +55 ºC |
| Sinusoidal vibration | 5 Hz to 150 Hz |
| Random vibration | 10 Hz to 300 Hz |
| Shock | 40 g shock spectrum |
| Quality standard | developed and manufactured in compliance with ISO 9000 |
| Dimensions (W x H x D) | 28 mm x 65 mm x 55 mm |
| Weight | 0.1 kg |

## ZS129C1

**Interfaces**

| | |
|---|---|
| SER CTRL | D-SUB plug, 9 pins<br>(mounted as X23 at the rear panel of the ZS129A5) |
| CTRL 1 and 2 | flat cables with 16-pin female connector |

**General data**

| | |
|---|---|
| Limit temperature range | -35 ºC to +55 ºC |
| Storage temperature range | -40 ºC to +70 ºC |
| Humidity | 95% relative humidity at +55 ºC |
| Sinusoidal vibration | 5 Hz to 150 Hz |
| Random vibration | 10 Hz to 300 Hz |
| Shock | 40 g shock spectrum |
| Quality standard | developed and manufactured in compliance with ISO 9000 |
| Power supply | +28 V DC |
| Dimensions (W x H x D) | 123 mm x 31 mm x 53 mm (without cables) |
| Weight | 0.2 kg |

# Ordering information

### Basic version

| | | |
|---|---|---|
| Switch Unit<br>comprising connection board and control connectors | ZS129A5 | 3023.2515.05 |

### Options

| | | |
|---|---|---|
| Switch 1-2<br>1-out-of-2 switch, DC to 3 GHz | ZS129S1 | 3024.6514.02 |
| Switch 1-6<br>1-out-of-6 switch, DC to 3 GHz | ZS129S2 | 3024.6520.02 |
| Switch 1-8<br>1-out-of-8 switch, DC to 3 GHz | ZS129S3 | 3024.6537.02 |
| Switch 1-2 Term<br>1-out-of-2 switch, DC to 3 GHz,<br>unused inputs terminated into 50 Ω | ZS129S4 | 3024.6543.02 |
| Switch 2-2 Transfer<br>2-out-of-2 switch, DC to 3 GHz | ZS129S5 | 3024.6550.02 |
| Switch 1-8 Term<br>1-out-of-8 switch, DC to 3 GHz,<br>unused inputs terminated into 50 Ω | ZS129S6 | 3024.6566.02 |
| DC Feed<br>100 kHz to 3 GHz,<br>feeds the supply voltage (28 V DC / ≤500 mA)<br>for an active antenna to one RF connector | ZS129F1 | 3024.6614.02 |
| Power Splitter 1-2<br>Resistive power splitter with 1 input, 2 outputs,<br>DC to 4 GHz | ZS129M1 | 3025.4515.02 |
| I²C Control<br>For remote control of the ZS129A5 via I²C bus | ZS129C1 | 3024.6714.02 |

Additional options are available on request.

## Extras

| | |
|---|---|
| 19" front panel<br>2 HU | on request |
| Parallel control cable<br>between GB127x and ZS129A5 | on request |
| I²C bus control cable<br>between GB127x and ZS129A5 | on request |

**ROHDE & SCHWARZ GmbH & Co. KG · Mühldorfstraße 15 · 81671 München · Germany**
**Tel.: +49 89 4129-0 ·Fax: +49 89 4129 13777 ·Internet: http://www.argus.rohde-schwarz.com**