

Mini-Circuits

DC to 18 GHz 2 x 32 500

Rack-Mount

**SMA** Female

## THE BIG DEAL

- Bi-directional, 2 x 32 blocking switch matrix
- One-to-one switch paths
- Low insertion loss between connected ports
- High isolation between disconnected ports
- Software automation via Ethernet & USB
- Convenient rack-mountable chassis



Generic photo used for illustration purposes only



## **APPLICATIONS**

- High throughput production testing
- RF test automation & signal routing
- 5G FR1 & FR3, WiFi 6E MIMO, UWB, Bluetooth
- Quantum computing
- MIMO antenna testing

## **PRODUCT OVERVIEW**

Mini-Circuits' ZTVX-32-18-S is a high performance, 2 by 32 blocking switch matrix, operating over a wide bandwidth from DC to 18 GHz. The system is integrated into a compact, 4U height, 19-inch rack-mountable chassis with all RF ports (SMA female) on the front panel and power / control connections on the rear.

The blocking configuration supports 2 active switch paths at any time, between the 2 "A" ports 32 "B" ports in a one-to-one arrangement. The matrix is bi-directional so the "A" and "B" ports can be used interchangeably as both inputs and outputs. This configuration is ideal for extending 2-port test equipment such as a VNA for multi-port or multiple device testing.

The switch matrix can be controlled via USB or Ethernet (supporting HTTP and Telnet network protocols). Full software support is provided, including our user-friendly GUI application for Windows and a full API with programming instructions for Windows and Linux environments.

## **KEY FEATURES**

Feature	Advantages	
2 x 32 matrix	Share high value test instrumentation such as a 2-port VNA or a signal generator and power sensor combination, for testing multiple ports or devices in parallel.	
Mechanical blocking matrix	One-to-one switch paths with low loss when connected and high isolation when disconnected; minimizing the impact of the matrix itself on sensitive RF test results.	
Ethernet & USB control	USB HID and Ethernet (HTTP & Telnet) interfaces ensure compatibility with most software environments and connec- tion requirements.	
Rack-mount chassis	Compact 4U height, 19" rack-mountable chassis suits integration in automated production test environments.	

# Blocking Switch Matrix **ZTVX-32-18-S**

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50Ω DC to 18 GHz 2 x 32

Rack-Mount SMA

SMA Female

## **ELECTRICAL SPECIFICATIONS AT +25°C (EACH SWITCH)**

Parameter	Conditions	Min.	Тур.	Max.	Units
Frequency	-	DC		18	GHz
	DC – 6 GHz		1.20	1.70	
Path Loss	6 – 12 GHz		1.75	2.25	dB
	12 – 18 GHz		2.25	2.75	
	DC – 6 GHz	80	90		
Isolation (Inactive Paths) <sup>1</sup>	6 – 12 GHz	70	80		dB
	12 – 18 GHz	60	70		
	DC – 6 GHz	80	90		
Isolation (Adjacent Ports) <sup>2</sup>	6 – 12 GHz	70	80		dB
	12 – 18 GHz	60	70		
	DC – 6 GHz		18		
Return Loss <sup>3</sup>	6 – 12 GHz		15		dB
	12 – 18 GHz		12		
Input Power				+20	dBm

1. Isolation from input to output on a disconnected path. Example: A1 to N1 isolation is the leakage measured at N1 when A1 is connected to N2.

2. Isolation between any pair of A or N ports. Example: Isolation measured from N1 to N2.

3. Return loss into all ports in all states. N ports are terminated internally (absorptive) when disconnected.



## **FUNCTIONAL BLOCK DIAGRAM**

**USB & ETHERNET** Blocking Switch Matrix **ztvx-32-18-s** 

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DC to 18 GHz 2 x 32 Rack-Mount SMA Female 500

## **CONTROL INTERFACES**

Ethernet Control	Supported Protocols	TCP / IP, HTTP, Telnet, DHCP, UDP (limited)
	Max Data Rate	10 Mbps (10 Base-T Half Duplex)
USB Control	Supported Protocols	HID – Full Speed
	Min Communication Time <sup>4</sup>	3 ms typ

4. Based on the polling interval of the USB HID protocol (1 ms with 64 bytes per packet) and no other significant CPU or USB activity

## **SOFTWARE & DOCUMENTATION**

Mini-Circuits' full software and support package including user guide, Windows GUI, API, programming manual and examples can be downloaded free of charge (refer to the last page for the download path). A comprehensive set of software control options is provided:

- GUI for Windows Simple software interface for control via Ethernet and USB
- Programming / automation via Ethernet
  - Complete set of control commands which can be sent via any supported protocol simple to implement in the majority of modern programming environments
- Programming / automation via USB
  - DLL files provide a full API for Windows with a set of intuitive functions which can be implemented in any programming environment supporting .Net Framework or ActiveX
  - Direct USB programming is possible in any other environment (not supporting .Net or ActiveX)

Please contact testsolutions@minicircuits.com for support

## **MINIMUM SYSTEM REQUIREMENTS**

Hardware	Intel i3 (or equivalent) or later
GUI (USB or Ethernet Control)	Windows 7 or later
USB API DLL	Windows 7 or later with support for Microsoft .Net Framework or ActiveX
USB Direct Programming	Windows 7 or later; Linux
Ethernet	Windows, Linux or macOS with Ethernet TCP / IP support

## **PROGRAMMING COMMANDS**

The key ASCII / SCPI commands for control of the system for control via the Ethernet or USB API are summarized below (refer to the programming manual for full details):

Command / Query	Description
:MN?	Read model name
:SN?	Read serial number
:FIRMWARE?	Read firmware version
:PATH:[A_port]:[N_port]	<ul> <li>Set a single switch state:</li> <li>[sw_label] = Switch number (1 to 24)</li> <li>[port] = The port to be connected to Com of the specified switch (1 or 2)</li> <li>Example :SPDT:1:STATE:2</li> </ul>
:PATH:[input_port]?	Get the state of all switches: • [input_port] = The "A" or "N" port name to check (A1 to A2 or N1 to N32) • Example :PATH:N12:?



## **GRAPHICAL USER INTERFACE (GUI) FOR WINDOWS - KEY FEATURES**

- Connect via USB or Ethernet
- Run GUI in "demo mode" to evaluate software without a hardware connection
- View and set all switch paths at the click of a button
- Configure automated switching sequences
- Configure Ethernet settings
- Update firmware

🚍 ZTVX (Ver. A3X7)		- 🗆 X		
Main Control     P Help     Block Diagram       Set Path     Model Name     Serial Number				
From         To         ■         ZTVX-32-18-S         02209270075 - USB         ▶           A2         ▼         N5         ▼         Protocol         IP         Password	1 1 2 2 3 1	53 24 20		
Show Command     Save to Quick Set Button     SEND     Set Description     Set				
Bit         10           Quick-Set Buttons         Configuration File:         FactoryDefault_2_32.txt         9         2         26           Set A1: N1-16         Set A2: N17-32         TAB5 (Empty)         Modify Buttons         10         1         53				
A2 -> N17         A2 -> N18         A2 -> N19         A2 -> N20         A2 -> N21           Image: Second	11         1           21         2           22         1	53 24 24		
A2 > N22     A2 > N23     A2 > N24     A2 > N25     A2 > N26       A2 > N27     A2 > N28     A2 > N29     A2 > N30     A2 > N31	23         1           24         0           25         1			
A2 -> N32 Query A2 Path EMPTY18 EMPTY19 EMPTY20 Clear All	26         1           27         1           28         1	24 24 24		
Manual Commands       Switch Commands     Connection Status:       Switch Commands     Switch States       Switch Commands     SP8T:24:SCounter?       Scommand X     SEND				
Command History       Temperature / Fans Status         [8/9/2023 9:17:38 AM] [Manual Comm] SCPI: CSP8T:24:SCounter? Result: 17;20;8;8;11;11;30;20 Return: 1       1         [8/9/2023 9:17:38 AM] [Manual Comm] SCPI: ClearAll Result: 1 - Success Return: 1       1         [8/9/2023 9:17:45 AM] [Set Path] [From:A1 To:N1] SCPI: :PATH:A1:N1 Result: 1 - Success Return: 1       Result: 1 - Success Return: 1         [8/9/2023 9:17:45 AM] [Set Path] [From:A1 To:N1] SCPI: :PATH:A1:N1 Result: 1 - Success Return: 1       Normal         [8/9/2023 9:18:09 AM] [Set Path] [From:A2 To:N5] SCPI: :PATH:A2:N5 Result: 1 - Success Return: 1       V				

**Mini-Circuits** 

**USB & ETHERNET** Blocking Switch Matrix **ZTVX-32-18-S SMA** Female

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DC to 18 GHz 2 x 32 50Ω

Rack-Mount

## **TYPICAL PERFORMANCE GRAPHS**









**USB & ETHERNET** Blocking Switch Matrix **ZTVX-32-18-S** 

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DC to 18 GHz 2 x 32 Rack-Mount SMA Female 50Ω

#### **ABSOLUTE MAXIMUM RATINGS**

Parameter	Conditions	Limits	Units	
Temperature	Operating	0 to +50	°C	
	Storage	-20 to +60		
Input Power (No Damage)	Cold switching	+30		
	Hot switching	+20	dBm	
	Into internal termination	+30		

Permanent damage may occur if any of these limits are exceeded. Operating in the range between operating power limits and absolute maximum ratings for extended periods of time may result in reduced life and reliability.

## **POWER SUPPLY**

Power Supply	AC mains input: 100-240 V, 50 / 60 Hz
Fuse	2A, 250V rating
Power Consumption	150W maximum

### **FRONT PANEL LED LOGIC**

LED / Port	Color / State	Switch Path State
A1	Off	Port A1 disconnected
	Green	Port A1 connected
A2	Off	Port A2 disconnected
	Orange	Port A2 connected
	Off	Port disconnected
N1-32	Green	Port connected to A1
	Orange	Port connected to A2

#### **CONNECTIONS**

Port	Connector
A1-A2 & N1-N32	SMA female
USB	USB type B
Ethernet / LAN	RJ45
AC Input	IEC C14 inlet



## **CASE STYLE DRAWING**



## **PRODUCT MARKING\***

Product Marking: ZTVX-32-18-S Product Description: 2 x 32 Switch Matrix Product Frequency: DC – 18 GHz Unit ID Label: Serial number and other identification marks \*Marking may contain other features or characters for internal lot control

## Mini-Circuits



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DC to 18 GHz 2 x 32 Rack-Mount SMA Female 50Ω

## DETAILED MODEL INFORMATION IS AVAILABLE ON OUR WEBSITE CLICK HERE

Case Style	99-01-2910	
Software, User Guide & Programming Manual	nttps://www.minicircuits.com/softwaredownload/ztvx.html	
Environmental Rating	ENV55	
Regulatory Compliance	Refer to our website for compliance methodologies and qualifications Www.minicircuits.com/quality/environmental_introduction.html	

Contact Us: testsolutions@minicircuits.com

Included Accessories	Part Number	Description
	CBL-3W-xx	AC power cord (IEC C13 connector to local plug) Select one option from the list below. Please contact testsolutions@minicircuits.com if your region is not listed.
Star Star	USB-CBL-AB-7+	USB cable (6.8ft) type A to type B
a a	CBL-RJ45-MM-5+	Ethernet cable (5 ft)
and the second sec	HT-4-SMA	SMA connector wrench (4" length)

AC Power Cord Options	Part Number	Description
a start and a start a s	CBL-3W-US	USA NEMA 5-15 plug (type B) to IEC C13 connector
-	CBL-3W-EU	Europe CEE 7/7 plug (type E/F) to IEC C13 connector
2	CBL-3W-UK	UK BS-1363 plug (type G) to IEC C13 connector
5 m	CBL-3W-AU	Australia & China AS/NZS 3112 plug (type I) to IEC C13 connector
	CBL-3W-IL	Israel SI-32 plug (type H) to IEC C13 connector

NOTES

- В. Electrical specifications and performance data contained in this specification document are based on Mini-Circuit's applicable established test performance criteria and measurement instructions.
- The parts covered by this specification document are subject to Mini-Circuits standard limited warranty and terms and conditions (collectively, "Standard Terms"); Purchasers of this part are entitled to the rights and benefits contained therein. For a full statement of the standard terms and the exclusive rights and remedies thereunder, please visit Mini-Circuits' website at www.minicircuits.com/terms/viewterm.html C.

A. Performance and quality attributes and conditions not expressly stated in this specification document are intended to be excluded and do not form a part of this specification document.

## Environmental Specifications

All Mini-Circuits products are manufactured under exacting quality assurance and control standards, and are capable of meeting published specifications after being subjected to any or all of the following physical and environmental test.

ENV55

Specification	Test/Inspection Condition	Reference/Spec		
Operating Temperature	-0° to 50° C Ambient Environment	Individual Model Data Sheet		
Storage Temperature	-20° to 60° C Ambient Environment	Individual Model Data Sheet		
Operating and Storage Humidity	5% to 85% RH (non-condensing)	Ambient		
Bench Handling Test	Bench Top Tip 45°& Drop	MIL-PRF-28800F		
Transit Drop Test	Free Fall Drop, 20 cm (7.9 inches)	MIL-PRF-28800F Class 3		
ENV55 Rev: A January 30, 2017 M160128 File: ENV55.pdf				
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